The Engineering and Mining Journal

WITH WHICH IS CONSOLIDATED "MINING AND METALLURGY."

VOL. LXXV. NEW YORK, SATURDAY, MARCH 28, 1903. No. 13.

THE ENGINEERING AND MINING JOURNAL AND MINING AND METALLURGY ESTABLISHED 1866

PUBLISHED EVERY SATURDAY.

261 BROADWAY, NEW YORK.

TELEPHONE 6866 CORTLANDT. P. O. BOX, 1833.

CABLE ADDRESS "ENGMINJOUR" NEW YORK.

W. J. JOHNSTON, President. F. J. PRATT, Treasurer.

T. A. RICKARD . . . . . EDITOR

FREDERICK HOBART, JOSEPH STRUTHERS, SAMUEL SANFORD . . . . . Associate Editors

SPECIAL CONTRIBUTORS

NEW YORK . . . . . R. W. RAYMOND, JOHN A. CHURCH

BOSTON . . . . . W. R. INGALLS

PHILADELPHIA . . . . . R. A. F. PENROSE, JR.

WASHINGTON . . . . . DAVID T. DAY, S. F. EMMONS, W. H. WEED

DENVER . . . . . PHILIP ARGALL

LONDON . . . . . A. G. CHARLETON, J. H. CURLE

JOHANNESBURG . . . . . G. A. DENNY

SYDNEY . . . . . F. DANVERS POWER

SUBSCRIPTION payable in advance $5.00 A Year of 52 numbers INCLUDING POSTAGE in the UNITED STATES, CANADA, MEXICO, CUBA, PORTO RICO, HAWAII or the PHILIPPINES. TO FOREIGN COUNTRIES, INCLUDING POSTAGE, $7.00; or its equivalent: £1. 8s. 9d.: 28 Marks; 35 Francs; or 35 Pesetas.

ADDRESSES CHANGED WHENEVER DESIRED

In requesting change of address give OLD as well as new address.

NOTICE TO DISCONTINUE

Should be WRITTEN to the New York Office in every instance.

Remittances may be made by P. O. Order, Express, Draft on New York or Registered Letter at our risk.

BRANCH OFFICES:

CHICAGO, Telephone, Harrison 3326, . . 520 Monadnock Block

CLEVELAND, Telephone, Cuy. C. 379, . . 327 Garfield Building

DENVER, ... 206 Boston Building

SALT LAKE CITY, ... 408 Dooly Building

BUTTE, MONTANA, ... 19 & 20 Owsley Block

SAN FRANCISCO, Tel., Bush 240, . . . 320 Sansome St.

VANCOUVER, BRITISH COLUMBIA, . Molson's Bank Building

LONDON, ENGLAND, ... 20 Bucklersbury, E. C.

DORTMUND, GERMANY, ... Arndt Strasse 56

ADVERTISING COPY

Should reach NEW YORK office by MONDAY morning of issue week; CHANGES OF COPY by the PRECEDING THURSDAY.

Copyright 1903, by THE ENGINEERING AND MINING JOURNAL.

Entered at New York Post Office as Second Class matter.

CONTENTS.

Editorial Notes	469
The Greene Consolidated Copper Company	469
Dust in Mines	470
The Anthracite Coal Strike Commission	470
Market Conditions	471
Metallics	471
Eutectic or Benmutic ....*F. Osmond*	472
Width of Furnace Relative to Tonnage in Copper Matte Blast-Furnace Practice....*J. Parke Channing*	472
Secondary Enrichment ....*C. W. Purington*	472
Assay of Cyanide Solutions ....*Alfred Chiddey*	473
Impurities in Commercial Cyanide ....*Godfrey Doveton*	473
Sampling of Mines ....*W. M. Courtis*	473
Standard Terms in Mining and Metallurgy ....*E. J. Johnston*	473
*Miner's Phthisis ....*T. Lane Carter*	474
Recent Literature on Building Stones ..*E. C. Eckel*	475
A Further Discussion on Ore Deposits	476
*A Mining Map of Central Idaho	479
Report of the Anthracite Coal Strike Commission	480
The Use of Carbide of Silicon	481
The Trail Smelter in British Columbia	481
Notes on Accidents Due to Combustion Within Air Compressors ....*A. R. Ledoux*	482
*Treatment of Slimes in Tanks with Conical Bottoms	482
Protection of Shareholders in English Mining Companies	483
Artificial Graphite ....*F. A. J. Fitzgerald*	484
Mica, Its Uses and Value ....*C. C. Schnatterbeck*	484
Canadian Graphite ....*H. B. H. Brumell*	485
Mining Companies in Bolivia	485
Nova Scotia Mines in 1902	486
*A Mine Ambulance	486
Abstracts of Official Reports	486
Recent Decisions	488
Books Received	488
Books Reviewed	488
Correspondence	489
Questions and Answers	489
Amendments to the Patent Laws	489
*The Manzel Lubricator Pump	490
*United States Patents	490
British Patents	491

* Illustrated.

DEPARTMENTS

Assessments	506
Chemicals, New York and Foreign	503
Coins, Foreign	505
Dividends	506
Financial Notes	505
Industrial Notes	493
Markets: Coal, United States and Foreign	500
Iron and Steel	501
Metals: Gold, Silver, Copper, Tin, Lead, Spelter, Antimony, Platinum, Quicksilver, etc. 504,	505
Mining News: United States and Foreign	494
Mining Stocks	500
Obituaries	492
Personals	492
Schools, Technical	492
Societies	492
Stock Market Review: United States and London....	500
Stock Quotations 506,	507
Trade Catalogues	493

IT IS GRATIFYING to us to see that the reports of the copper companies in the Lake Superior region are generally giving much fuller information than heretofore. Some of these companies—like the Atlantic—have always given very full and valuable information; but other companies, which have in previous years given only a few figures of earnings, dividends and the like, are now furnishing their stockholders with full statements of production, costs and details of operation. We need hardly say that the JOURNAL has always advocated the publication of full reports; and the appearance of such statements should be noted as a sign of improvement.

⚒

WE DESIRE to draw attention to an article on a matter of essentially practical importance which we publish on another page. Dr. Ledoux's account of a fatal accident due to foul gas, generated by combustion within an air-compressor, should command attention. All of us who have been at any time in touch with conditions underground are aware of complaints of bad air made by drill-men under circumstances when the cause of it was not explainable in an ordinary way. It is quite possible that such combustion within an air-compressor may be due to the ignition of carbon, derived from the dis-association of the hydro-carbons of the oils used in lubrication. In the receivers and pipes of air-compressors, it is not unusual to find a deposit of carbon in the form of lamp-black, and it is possible that this becomes ignited by, again possibly, an exciting impurity in the oils which are used. As it is a matter affecting human life it merits thorough investigation and we publish Dr. Ledoux's paper to that end.

⚒

THE REPORTS that negotiations were pending for the sale of the Jones & Laughlin Steel Company's property to the United States Steel Corporation were originally denied by the parties in interest, but remain so persistent that it seems very probable that there is a foundation to them. The Jones & Laughlin Company is at present one of the most important producers outside of the United States Corporation. It owns plants of the most modern type, and is, moreover, in control of a very considerable iron ore property in the Lake Superior region. This would be a strong inducement for the purchase, apart from the importance of its production. Perhaps, as we have heretofore pointed out, the iron ore interest would be the chief reason for the deal. It is reported that the price asked for the Jones & Laughlin properties is $80,000,000, which probably is not excessive, as compared with the amounts paid in other recent sales of similar property. The transaction, should it be carried out, will doubtless be advantageous to the United States Steel Corporation, but it is to be regretted from the point of view which we have recently indicated in our columns.

⚒

THE GREENE CONSOLIDATED COPPER COMPANY.

In our issue of March 14 we published, under the head of "Correspondence," a letter which severely criticised the Greene Consolidated Copper Company. This letter appeared to us to be written in good faith, and was therefore published over the signature of the writer of it. We find, on a closer analysis of the data given in the communication referred to, that the statements made are untrustworthy. Having no desire to belittle any legitimate mining enterprise, we do not hesitate to make this correction.

It may be added that the letter received insertion because the Cananea mines, now owned by this company, have had a chequered career, in which suspicious methods, stock manipulation and extravagant management have all played their part. Lately, however, the administration has undergone a distinct change, by the election of new directors, whose reputation and standing should be a guarantee that different methods will prevail at this important property in the future. Investigation prompts us to say that there is room for further improvement, that there is need for more economy, and that efficiency at the Cananea mines can only be obtained by utilizing the services of men having capacities commensurate with the high rank among the copper mines of this continent which the Greene Company claims for itself. We are in no way concerned with the ways of the stock market, but we do take a keen interest in the technical administration of mines and smelters, therefore we regret that the company should recently have issued an annual report as notably supplied with fine photographs as it was lamentably deficient in financial data concerning costs and earnings. While the letter referred to, on investigation of the case, does not receive our indorsement, nevertheless we feel that there is room for a criticism of a better kind and for the expectation of such an alteration in the methods of the Greene Consolidated Company as will reflect the intelligence of the experienced financiers who have recently joined its directorate.

DUST IN MINES.

The mining community at Johannesburg is a good deal perturbed by the increasing prevalence of miner's disease, a form of lung trouble due to the excessive dust which pervades the underground workings of the district. In consequence of the general use of rock-drills and the absence of water seepage at the lower levels of the Rand, there is more dust than is usual in gold mines. The miners inhale it and suffer thereby.

It has been suggested that the wasteful use of oil in lubricating the drilling machines tends to intensify this trouble by coagulating the fine particles of rock. This is not proven. Good authorities are inclined to impute the injury done to the sharp edges of particles of rock, whereby they bury themselves in the tissue of the lungs. The question of the large amount of oil used by drill-men has also come up for discussion in the Black Hills (South Dakota), where it was supposed that amalgamation in the stamp-mill was hindered by the oil thus introduced into the ore while it was being broken. Whether grease is directly prejudicial to amalgamation is a matter on which there is more doubt than heretofore. Tests have been made which indicate that the general impression, to this effect, is a delusion. However, in the case cited, a mixture of soap and water was substituted for the oil. The men were in the habit of using as much as a quart can of oil in a single shift. With soapy water one is able to introduce that medium around the worn parts of the piston and the drill-stem which is necessary to smooth motion. Of course, before laying the drill to one side, it is well to admit a little oil so as to eject the soapy water, and thus obviate the formation of any rust during such time as the drill remains idle.

Coming back to the dust problem, we are aware that not in South Africa alone, but in many of the mining regions of Australia, the same effect is being noticed upon the health of miners. This means that water in some form must be introduced to prevent the raising of dust. The injection of water through the drill piston was used successfully as much as fifteen years ago by Lieut. Derby, in the excavations made at Hell Gate, New York. It is an old device, and has been adopted more recently in the Leyner machine, which employs a hollow drill head, 18 ins. long at the end of a steel pipe. This use of water is helpful in overhead holes and in shattered ground, although it may weaken the drill itself when employed in attacking very hard rock. As a means of introducing water it has the drawback, therefore, of limiting the scope of the drilling machines, and it is not likely to be generally adopted. But necessity is the fruitful mother of devices for overcoming such difficulties, and it is to be expected that the demand will call forth some invention which will solve the problem. It is obvious that the accumulation of dust in the heading of a mine, by reason of the pulverization of the rock by the drill, can be abated by wetting that dust before it is thrown out of the drill hole, and that, to do this, no great amount of water is needed. Besides its healthful effects, such water should increase the efficiency of the drilling machine by helping to eject the dust at the bottom of the hole.

The experience of the European coal mines should prove helpful to our friends on the Rand, even though the conditions are as wide apart as the geography. In Austria it is the practice in certain mines to turn on a spray when the holes are fired (by electricity), so that during the moment of blasting the water makes a protective shield separating the heading from the other workings. This may not be applicable to the gold mines, and it may not be necessary, because the dust made in blasting is slight compared to that caused by drilling, but it is well known that the fumes from dynamite are among the factors injurious to health, and we observe that Mr. T. Lane Carter, in his article on the subject, refers to this particular aspect of the inquiry.

Of course, there is not much water available on the Rand gold-fields, so that it will have to be economically used, and this will be another factor which must be regarded in devising any mechanical improvement for obviating the dust. However, it is apparent that the line of advance against miner's phthisis will be by means of the introduction of some form of water injection apparatus, and we trust that the contribution, appearing on another page, which Mr. Carter has sent us from Johannesburg, will stimulate the investigation of a subject which so directly affects human life.

Mr. Carter suggests that our Western mine managers should contribute their experience in this matter so as to help their friends in South Africa. We second this invitation. At first sight, it would seem that not much response is likely, because our metal mines are usually wet, by reason of being situated in regions visited by snow and on account of the free influx of ground-water which seeps throughout the workings. At Johannesburg the inflow of water ceases usually at the shallow depth of 150 to 175 ft., therefore the lower workings become extremely dry. But this is not a decisive factor. The heading of a drift or cross-cut in a wet mine may be fearfully dusty by reason of the pounding of the rock by the drilling machine, even though water is oozing out of the adjoining walls. Of course, the dust will not extend into the other workings because the damp air serves to settle it, but, as regards the harm done to the drill men at the heading, there is not so much to choose between a wet and a dry mine as would at first sight appear. Therefore, we hope that this invitation from Johannesburg, for advice and suggestion will evoke a useful response from mining engineers who direct operations even in countries which are less arid.

⚒

THE ANTHRACITE STRIKE COMMISSION'S AWARD.

When President Roosevelt, last October, appointed a commission to investigate the causes leading up to the strike of the anthracite miners, attention was called to the fact that the strike involved something more than rates of wages and hours of labor. The great issues were the rights, privileges and duties of labor organizations, matters of fundamental importance to this country.

The commission has recognized the opportunity. Its report will doubtless be quoted in the settlement of future labor disputes and it should arouse the rank and file of the labor unions to act with more discretion during strikes and to show more respect for the law at all times. The report is very conciliatory in tone, the commissioners apparently wishing to offend none of the parties in the case; but on the real issues the commissioners speak so clearly and forcibly as to reach the understanding of many a man who has either refused to think about matters which are the very foundation of constitutional government or has had his reason clouded by appeals to class hatred, ingenious misrepresentations and rank falsehoods—the stock in trade of the demagogue and the sensational newspaper. The report admits the right of laboring men to organize, and to strike; it also favors what is termed collective bargaining between employers and employed. At the same time there is a rigid insistence upon the privilege of each and every man to sell his labor without fear of molestation or injury; the commissioners utterly repudiate the doctrine that a majority of the laborers in any industry have the right to determine whether a minority shall work or shall not. Here the report voices what may be considered the sober judgment of all honest-minded unprejudiced men and for this reason, if no other, the commission has justified its appointment.

Elsewhere in this issue will be found a summary of the awards made by the commission, together with the most important of its findings and recommendations. The space here available forbids a detailed discussion. Briefly, the contract miners get a 10 per cent increase in pay and can have check docking bosses; engineers employed in hoisting water, and firemen get an 8-hour day; other engineers and pumpmen get a 5 per cent increase, and are relieved from the long shift on Sunday; other company hands get a 9-hour day. The appointment of a board of conciliation, with three members representing the miners and three the operators, practically amounts to an indirect recognition of the Union.

The miners in the first district do not get what they wanted most, namely, a change in the system of paying for coal mined. The operators are not called upon to make certain concessions which many expected. As for the third party involved in the strike, the public, the report intimates that, as the supply of anthracite is limited and the cost of production is increasing, higher prices are to be expected in any event.

There will be differences of opinion as to the justice of some of the awards—for instance, an 8-hour day for pumpmen—and the expediency of others—such as making the companies responsible for the payment of check weighmen and docking bosses who are appointed and accountable to the mine employees—but considering the increased wages secured within the past two years by men in other industries and the very substantial advances granted bituminous miners this winter, the awards as to wages and hours will generally be deemed reasonable. The findings on which these awards are based are of much interest, and we greatly regret that space forbids our printing them in full.

We had occasion last summer to criticize the correctness of many statements made by Mr. John Mitchell in his appeals for public sympathy and aid. We note that the report shows that the statements we criticized have not been supported by testimony and were not in accord with the facts.

This is not likely to trouble Mr. Mitchell, who, in the belief that the end justified the means, did not hamper himself with too many facts. It is fair to point out, however, that in its mention of Mr. Mitchell and its rather mild allusions to conditions that last summer made the law a reproach and the constitution of Pennsylvania a thing of derision, the commission's report shows faintly but still legibly the print of the cloven-hoof of political exigency.

This, in the main, is traceable to the logic of circumstance. The public knows little of the political intrigue and trickery, the scheming and wire-pulling that helped to start and prolong the strike. Considering the utter selfishness and even shamelessness of some of the politicians involved, and considering also that the commission was, nominally, at least, a non-partisan body aiming at conciliation, it is not strange that the report is incomplete in one important respect and that the commissioners have not always called a spade a spade. The inner history of the great strike of 1902 would be interesting reading—although the commission might not be expected to tell all it found out. Yet it is a pity that the report does not state, what some of the commissioners must know, why a bare majority, 57 per cent, of the delegates to the Hazleton convention last May voted for a strike and why the vote was contrary to the expectations of the great majority of men interested in anthracite mining.

We have alluded to the service the commission has done by pointing out the steps that labor organizations must take to gain public confidence, but its findings are valuable in other directions as well. For instance, it states that the anthracite miner does not pursue a more hazardous calling than many other men, that his earnings are not so poor as many people have thought, and that the opportunities for intellectual and moral training in the anthracite communities are fully up to the American standard. Henceforth reputable newspapers should abstain from printing such misleading opinions as appeared in their editorial columns last summer, while yellow journals will find their task of promoting class hatred, by references to "coal barons" and "down-trodden miners," much more difficult. This means a distinct gain for decency and truth.

Even more important, however, is the fact that, irrespective of the awards being in force three years, the establishment of a board of conciliation and the other attempts of the commission to lessen the friction between operator and miner, the public is not likely to be put to the expense and inconvenience of another strike for several years, for the simple reason that the miners now have no acknowledged grievances on which to appeal for public sympathy and aid.

Another result that may be expected from the costly strike and the awards of the commission is that the anthracite companies will be less arbitrary in their attitude toward the public. Had the presidents of the anthracite roads stated their case as plainly last May as they stated it to the commission, they would have had public opinion on their side and the strike would not have been prolonged till winter was in sight. In particular it is to be hoped that the President of the Philadelphia & Reading Railroad realizes that however honest and sincere were his intentions, he yet was guilty of grievous blunders. It is also possible that the companies he represents may decide that publicity, in the long run, is better than secrecy, and that a great corporation which, either from stock marketing or other motives, fails to give its stockholders a full and clear statement of its earnings, assets and liabilities, is inviting trouble in the hour of need.

Doubtless some will wonder why the operators did not end the strike last May by making a few concessions, less than they are now compelled to make. The answer is that the operators recognized that any concession would have been the basis for further demands this spring, and they believed that nothing could be gained by temporizing. Whether or not the commission's hopes will be realized, through awards that are to be binding for three years, remains to be seen. The anthracite communities contain a mixed population, and many men easily influenced by the scheming demagogue or labor politician. The awards of the commission deserve success. What the politicians will do next year remains to be seen.

⚒

MARKET CONDITIONS.

The metal markets continue strong and in very good condition, notwithstanding occasional reactions in price, which naturally follow the recent rapid advances.

In copper the London market has shown a slight decline and there has been a check in the advance here, which hardly amounted to a reaction. This is the natural consequence of the recent advance, in which, as in all cases of the kind, a tendency developed to move a little too fast. As we showed last week, the position at present is very strong. Spot metal is scarce, while consumption continues very large. In some cases manufacturing concerns using big amounts of copper have urged producers to make deliveries ahead of the contract time, but in most cases it has been difficult, or indeed, impossible to comply with such requests, the metal being as a rule, fully sold up for some time to come.

Tin has shown a reaction both here and abroad, principally due to speculation in the London market. The position of this metal is well understood, and it is, in fact, the only important metal which can be manipulated, with very little regard to actual circumstances of supply and demand.

Spelter continues strong, demand from galvanizers and brass manufacturers being very good. In the Joplin region, the mines are suffering from long continued bad weather preventing the transportation of ore to shipping points. In some cases also, mines at a distance from the railroad have found it difficult to get coal to keep their pumps going. In consequence supplies of ore are very short and the smelters generally have used up any accumulated stocks they may have had. The consequence has been very high prices for ore.

Lead continues in strong demand at unchanged prices, and consumption is very good indeed.

Silver remains about the same, the market having been supported by increased buying for the Indian bazars and by the expectation of some orders for coinage.

The iron and steel markets show little change. The furnaces which do not control their own supplies of ore are generally closing the season's contracts for Lake ores. Stocks on Lake Erie docks are being rapidly reduced and there will be plenty of room when navigation opens and the first cargoes arrive. From present appearances shipment of ore will begin early in April. Selling of pig iron for the third and fourth quarters of the year is going on in the Central West; and in the South a good many inquiries are being made for such deliveries. It looks very much as though furnace capacity would be pretty well taken up next month. In finished material business for merchant bar, plates and structural steel continues very good. The strike of the bridge workers continues, with no immediate prospect of a settlement. In imported material the situation continues very much as recently noted and foreign sellers do not seem so much inclined to make concessions, as they were two or three months ago.

The Western coal trade is getting into somewhat better shape. The Lake shippers are preparing to open the season, but the question of early rates to Lake Superior ports is still unsettled.

The Atlantic seaboard bituminous trade continues quiet, with no marked changes in the conditions at the mines or at tidewater.

In the anthracite trade buyers are waiting to see what the companies will do now that the Anthracite Strike Commission has made its report. Demand is light owing to the unusually warm weather which has prevailed for some time, and the output at the mines is being curtailed. It is altogether likely that the shipments for March will fall below those for March, 1902.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

The great tragedy of Science is the slaying of a beautiful hypothesis by an ugly fact.

The King's road of scientific and technical progress is the straight path of painful observation and experiment, and few there be that enter therein.

Geology is every day assuming a greater importance in mining, but among its fundamental conceptions we must try to distinguish between what is assured and what is only more or less probable.

The first mention of coal is made about 371 B. C., by Theophrastus, a pupil of Aristotle, who in a treatise "on stones," speaks of coal as fossil substances, that are called coals (λιθος ανθρακος), which kindle and burn like wood coals.

That the Romans in England used coal is proved by the coal ashes found in Roman camps in various parts of the country—near Manchester, in the West Riding of Yorkshire, and in Northumberland and Durham.

The year of the signing of the Magna Charta, 1215 A. D., marks the birth of the coal trade in England. Coal then appears to have passed into the hands of the subjects of King John, along with peat and other things, as a mere surface material not worth mentioning. From this date, therefore, which gave security to property, coal may be said to have been worked and sold as an article of commerce.

In 1239, Henry III, granted a charter to the citizens of Newcastle-on-Tyne, giving them a right to dig coals in the Castle Field and Frith.

About 1257, coals were first imported into London from Newcastle. The Nobles and Commons assembled in Parliament complained against its use as a public nuisance, corrupting the air with stink and smoke, and sea coal was prohibited in London by royal proclamation in 1306; but the loyal citizens of London paid no heed to it, and continued burning the coal.

In the early days the mining operations were carried on by means of "bell-pits," sunk near the outcrops, and similar to the bell-pits in Sussex, which were sunk to find flint for stone implements.

Real knowledge in science means personal acquaintance with the facts, be they few or many.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

EUTECTIC OR BENMUTIC.*

To the Editor:

Sir.—In your issue of January 24, Prof. Howe discusses the convenience of certain new terms in the metallurgy of iron, and I find myself personally drawn into the case. I was the first, or at least among the first, to give the name of eutectic (*acier eutectique*) to the steel which is completely transformed at the lowest atmosphere. As the word "eutectic" signifies, literally, "well melting," and as the question at issue is the designation of a process not accompanied by fusion, I must confess that the criticism of Prof. Howe is, from a logical standpoint, incontestably correct.

However, I would plead extenuating circumstances. The formation of languages is not inspired solely by logic, but also by sentiment, and if the word be permissible in matters scientific, by poetry. When, in order to describe a phenomenon which is not fusion, but which in physics is comparable to it, and which follows the same laws, I retain a term which, strictly speaking, is not applicable save to fusion only, assuredly I do so by way of metaphor. But has not this metaphor the advantage of recalling a profound similitude hidden under diverse appearances? The proceeding is usual, and it does not seem to me that it will give rise to any serious difficulty. In all languages, the number of words thus twisted from their first accepted meaning is considerable. For example, we have borrowed from the English language the word "square," in order to designate the public gardens in cities; it is probable that the first English square was actually square (*carré*), or nearly so, but nowadays we have squares which are round or triangular, and no one bothers about this anomaly of language.

If, however, it should seem desirable to create a new word, I would reproach "benmutic" with being a little too condensed, and I would propose a slight modification, retaining, however, the same derivation. The Latin expression, the adoption of which I would suggest, is "bene mutabilis." "Bene mutabilis" has given us in French *bienmuable* or *benemutable*, according as the word was introduced by spontaneous popular transformation or by the literature of a more recent epoch. As we are talking of an international word, it is the form "benemutable" which best commends itself; it has the defect of being a little longer than "benmutic," but it conforms better to the style of the Neo-Latin languages.

As to the second question, namely, the opportunity of bestowing a name to the solid solution of ferro-carbon and the choice of such a name, I feel no little embarrassment, since it is myself whom my friend, Prof. Howe, with a graciousness for which I am profoundly grateful, proposes to choose as sponsor for the term to be created. I am in entire agreement with Prof. Howe as to the utility of such a term, especially from the standpoint of instruction. It occurs to me, however, that it would be preferable to wait a bit longer, until our researches into the alloys of iron and carbon are more complete. As a matter of fact, if one turns back to the masterly discussion of Prof. Bakhuis Roozeboom (*Zeitschrift fur Physikalische Chemie*, XXXIV, 437; or *Bulletin de la Societe d'Encouragement pour l'Industrie nationale*, (5), VI, 609) there is still some hesitation between the diagram 2 and another diagram, such as 5 or 6. If the diagram 2 be correct (and it is the one which appears to me the most probable) the solid solution has forthwith its name. It is "austenite," the only constituent of steel which represents this solution intact, without any beginning of transformation. It seems to me then that we could adopt it provisionally. There will always be time enough to introduce a modification if the progress of our knowledge shows the necessity of it, but if it should be confirmed that it is indeed the term "austenite," which is applicable to the case, then Prof. Howe would certainly regret, with me, his suggestion of to-day.

F. OSMOND.

Paris, Feb. 24, 1903.

* Translated by the Editor.

WIDTH OF FURNACE RELATIVE TO TONNAGE IN COPPER MATTE BLAST FURNACE PRACTICE.

To the Editor:

Sir.—I have read Mr. Van Liew's communication on this subject, in your issue of to-day, and quite agree with him that it is desirable to disseminate as much as possible all information concerning metallurgical practice for the common good of all concerned.

The object of smelting any ore is to secure as great an extraction as possible at a minimum cost. In other words, the cost of extraction is the operating expense, plus the value of the slag loss.

Certainly, Mr. Van Liew's figures seem to indicate that a narrow furnace gives a greater tonnage per square foot of hearth area, but are we striving for this particular record? Is it not rather the broad question of cheap and efficient smelting?

I do not agree with Mr. Van Liew that a furnace 150 ft. long would do ten times as much work as one 15 ft. long. If I am correctly informed, at the Boleo property in Lower California, some 30-ft. furnaces were erected, were found unsatisfactory, and finally divided into two. I fear that a furnace of this kind might be much like the Siamese Twins, with one having a congested chill and the other a burning fever.

Theoretically, providing the hearth area was the same, a circular furnace would be the cheapest to construct, and in Arizona they still consider that they get better results from an elliptical cross-section. If furnaces were made narrow and long, it would mean increasing the size of buildings, particularly if the furnaces were put end to end, which seems to be the best method of arranging when mechanical charging is used. If this point is taken into consideration, I think that the total cost of the plant would be found higher than in the case of furnaces approaching a square in their cross-section.

Our experience in Tennessee with a 56 by 180-in. furnace has been very satisfactory, and with a constantly increasing tonnage, so that we, on our part, are of the opinion that there should be a certain ratio between length and width, and that if we made our furnaces, say, 240 ins. long, it would be well to increase the width to 66 ins. This, however, is purely theoretical.

At the Great Falls plant of the Boston & Montana Company, Mr. Frank Klepetko, in 1896, made some extensive experiments with three furnaces, each 180 ins. long, and widths, respectively, 42, 56 and 72 ins. The concensus of opinion, after several months of experimenting, was that the 56-in. furnace gave the best results, and it was for this reason that in designing the Tennessee Copper Company's smelting plant, I followed the result of Mr. Klepetko's experiments. The relative tonnage of the three experimental furnaces at Great Falls, in the same order as above given, was 330, 440 and 400.

Turning now to the question of coke consumption, we find in Tennessee that we use somewhat less coke than our neighbors, the Ducktown Sulphur, Copper and Iron Company, which runs small Herreshoff furnaces. Certainly at Great Falls there was no noticeable difference in the coke consumption of the three furnaces.

It certainly would take more men on the feed floor and the tapping floor to run five 300-ton furnaces than it would three 500-ton furnaces, even assuming that the cost of charging was in both cases the same.

As regards power consumption for blast, I am quite ready to admit that the large furnace consumes more horse-power, but I am of the opinion that this increased cost is more than offset by other advantages.

To say that mechanical charging is not defensible is tantamount to saying that we should not replace labor by machinery. I am well aware that metallurgists consider that a hand-charged furnace will run faster than one in which the material is irregularly dumped. In large furnaces, however, it is not as apparent, and the top of the charge can be kept level almost as well as in a small hand-charged furnace.

In the month of January, 1903, the Tennessee two blast furnaces smelted 28,699 tons of charge in 57½ furnace days, not including blast furnace products resmelted, and the expense was as follows:

Coke, 0.1233 tons, at $4.93	$0.6082
Quartz, 0.0958 tons, at $0.90	0.0862
Supplies, including coal for power	0.1266
Labor and superintendence	0.2111
Total	$1.0321

In the above figures, the price of coke is abnormally high, on account of the activity of the Southern iron market, though, we expect that with the completion of new ovens, the price will return to a normal one of about $3.50.

Labor averages about $1.55, so that we may assume about 0.14 of a shift per ton of ore. This includes, in addition to the furnace labor, the proper proportion of surface and power house labor, the balance going to converter expense.

The charging expense for the month of January, which included motormen, car loaders and dumpers, repairs to motors, cars, tracks and scales, and power for operating the electrical locomotives, cost as follows:

Labor	$0.0340
Supplies	0.0119
Total	$0.0459

I doubt very much if hand labor could in any way compete with these figures, or whether the increased efficiency of the furnace would more than counterbalance the saving in handling the material.

Our slags in Tennessee run about as follows: SiO_2, 31.54; Cu, 0.49; FeO, 52.25; Mn, 0.79; Zn, 2.02; Al_2O_3, 3.50; CaO, 5.93; MgO, 1.86; S, 1.25.

I cannot forget the opening sentence of the late Prof. Egleston, in his first lecture to me as a student, in which he said that "Metallurgy is the science of extracting money from ores." I fear that many of us are carried away with the idea that high tonnage per square foot of hearth area, or low slag, is what we are striving for, and often forget the commercial side.

J. PARKE CHANNING,
President Tennessee Copper Company.

New York, March 21, 1903.

SECONDARY ENRICHMENT.

To the Editor:

Sir.—The interesting communication, by Mr. Matt. W. Alderson, published in your issue of March 7, 1903, contains some suggestive ideas. Every contribution to the subject of secondary enrichment of ore-deposits is naturally welcomed by students of mining geology.

One or two minor points in Mr. Alderson's letter are not clear to me. He says, "My observation is that gem-stones generally are amorphous, as are also a large proportion of the rich minerals. Most gold nuggets are amorphous, as is shown by their smooth, apparently polished exterior."

The generally accepted definition of the word "amorphous" I have always taken to be: Without

form, structureless. A given piece of any mineral, such as a gold nugget, may possibly have a "smooth, apparently polished exterior," and yet not be amorphous in structure. Mr. Alderson may hold the opinion, which has been advanced by some investigators, that gold nuggets are formed by an accreting process. My observations have led me to believe that gold nuggets are resultant masses, shaped by attrition from what were still larger masses of gold formed originally in ore-deposits.

Be that as it may, I cannot admit the general statement that "gold nuggets are amorphous." Gold may occur entirely massive, but any large collection of gold nuggets from various localities will exhibit specimens in which the octahedral faces, or the lines of incipient crystallization, of the gold may be seen. This is especially the case in those nuggets to which pieces of the original vein-quartz are found adhering. It is indeed not impossible, that the careful cutting of a face on a gold nugget, and the subsequent polishing of it might result in the discovery of crystalline lines, of a character similar to those exhibited by the polished face of a piece of meteoric iron. (Widmanstatten figures.)

In regard to gem-stones, Mr. Alderson's rather sweeping observation is, I think, subject to controversy. The diamond, as is well known, crystallizes in octahedral form. Of the corundum gems, both the ruby and the sapphire have crystalline forms. Beryl, and its variety emerald, occur in the form of hexagonal prisms. This mineral may occur in amorphous form, but I have never seen it. Topaz has a well-marked cleavage, which is very apparent in many specimens. Amethyst, a form of crystalline quartz, does not occur amorphous; at least no mention has been made of such a form. Tourmalines occur in triangular prisms, of the rhombohedral system. Garnet crystallizes ordinarily in dodecahedrons. Turquoise and opal are, so far as I know, the principal examples of gem-stones which occur amorphous. These are by no means sufficient to warrant the statement that gem-stones generally are amorphous.

Mr. Alderson says farther on, "and we are all agreed on one point, and that is that all precious metal deposits, with the quartz accompanying them, were derived in one way or another from substances held in aqueous solution." This is too inclusive a statement to pass unchallenged. Gold is a precious metal. Its occurrence in quartz-veins of normal type is generally admitted to be of aqueous origin, in the sense that it is deposited from heated water solutions. Evidence is accumulating, however, which is indicative that deposits of gold occur native in igneous rocks, the gold being an original constituent. As occurrences of gold without silver contents are unknown, silver must be included in any mention made of the occurrence of gold.

Platinum has been found, in the only occurrences where its presence has been determined in primary deposits, in connection with chromic iron, as an original constituent in peridotites and other basic rocks. Igneous origin must be attributed to it, and the agency of aqueous solutions is unnecessary to account for it. Quartz does not occur in connection with it, so far as has been observed or recorded. I refer to the researches of Rose and Inostrantsef on the Nijni Tagil platinum deposits, and to Zaitsef's investigation of the deposits of the Tura and Iss rivers of the Ural. The results obtained by Zaitsef I have confirmed by personal observations. (*Transactions* American Institute Mining Engineers, Vol. XXIX, 1899, page 3.)

The points which I raise are not directly pertinent to the discussion of secondary enrichment of ore-deposits. I take the liberty of suggesting them, however, urging as a standpoint that the premises used in argumentation should be exact and well founded, in order that the conclusions drawn from those premises may have value.

C. W. PURINGTON.

Denver, Colo., March 11, 1903.

THE ASSAY OF CYANIDE SOLUTIONS.

To the Editor:

Sir.—In your issue of November 15 there appeared an article on "Methods for Assaying Cyanide Solutions for Gold." As the matter is one of great interest to all cyanide workers, the following communication may not be amiss:

I have been experimenting for some time in trying to find a more rapid method than those in ordinary use and have at last devised the following: Introduce into a porcelain dish 4 assay-tons, or more, of the solution to be assayed, add 10 c.c. of a 10 per cent solution of acetate of lead, then 4 grammes of zinc shavings; boil a minute, add 20 c.c. of hydrochloric acid. When the action has ceased, boil again; wash the spongy lead with distilled water; transfer it with a stirring rod to a piece of filter paper; squeeze into a compact lump and place in a hot cupel. The mouth of the muffle should contain a piece of dry pine wood so that the muffle is filled with flame at the moment of introducing the spongy lead.

The above process, which I believe is strictly original, gives slightly higher results than the evaporation process as ordinarily conducted, and it is much more rapid, occupying only 25 minutes.

The proportion of silver to gold in our solutions here is about 10 to 1. In the case of very dilute nearly pure gold solutions, I would suggest the addition of a known quantity of nitrate of silver dissolved in cyanide before adding the acetate of lead.

ALFRED CHIDDEY,
Cyanide Manager El Transito Mine.

Amapala, Honduras, Feb. 10, 1903.

IMPURITIES IN COMMERCIAL CYANIDE.

To the Editor:

Sir.—I read with interest the abstract of Mr. A. Whitby's paper, "Notes on Commercial Cyanide of Potassium," which appeared in your last issue, but beg to take exception to one portion. Mr. Whitby is quoted thus: "It is hard to understand why so much discredit has been attached to alkaline sulphides in cyanide."

I have had occasion to employ at times a cyanide containing a considerable quantity of soluble sulphides, yet in which the cyanogen content was normally high (96 to 98 per cent as KCN). The extractive power of this cyanide freshly made up was low, and in order to bring it up to a normal efficiency the sulphides had to be completely removed.

In the working solutions to be re-standardized there was more than sufficient zincate of potash to precipitate the sulphides, but the presence of the precipitate of zinc sulphide was found to be equally as obnoxious in extraction as the alkaline sulphide. Precipitation with lead salt was attended with the same result, the solution contaminated with lead sulphide having a very low extractive power.

To obtain the best results with this cyanide, it was imperative to completely remove the precipitated sulphide from the solution. This was done by dissolving half a ton of the cyanide in a small vat, using sump solution, some slaked lime, and the requisite amount of lead solution. This concentrated cyanide solution was drawn off as required for re-standardizing the mill solutions, through a filter, entirely free from suspended or soluble sulphides.

An excellent example of the effect of sulphides on the extractive power of cyanide solutions, came under my notice recently. While reducing zinc-gold-slimes in a vat which was not provided with an efficient hood for the removal of the fumes, the mill solutions became slightly charged with sulphuretted hydrogen, becoming a dark straw color. On testing the extractive power of this solution it was found to be exceedingly low, and subsequent assays made of the tailings from vats then under treatment, disclosed an extraction very much less than the average.

GODFREY DOVETON.

Denver, Colo., March 4, 1903.

SAMPLING OF MINES.

To the Editor:

Sir.—I have read your articles on sampling with much interest. Personally, however, I believe in what you call "grab samples." Experience in buying ore has given me a fair judgment as to the average appearance of any special lot. In veins I like to know what each band of particular appearance runs, and especially I want the owner of the mine to show me the richest part of the lode, so that I may know its proportionate value with the rest of the vein matter, from which I take grab samples. These samples act as checks on the larger average samples taken. Now these, when put away in my pocket, have twice saved me from being "salted."

I think a man with experience can tell pretty well in most cases what is a representative piece of ore, and use it as a check on the average samples which are so easily tampered with.

For taking samples, I believe in a locked mail bag of leather, which will easily show punctures, and also blank samples already prepared to put in with the samples taken from the mine. This bag when taken underground is as safe a guard as anything can be against the samples being tampered with.

Large samples weighing a ton or more are, of course, best, but at mines unprovided with crushers, help is needed to crush them down, which increases the risk.

One man, whom I know, prepared little balls of clay containing gold washed out of the ore, which could be thrown from quite a distance into the pile without it being likely that they would be observed. A grab sample in this case would be all that would save one from a false estimate.

For young men your advice could not be improved upon, but each man as he gains experience has to be a law unto himself.

W. M. COURTIS.

New York, March 7, 1903.

STANDARD TERMS IN MINING AND METALLURGY.

To the Editor:

Sir.—In the discussion started by Mr. Philip Argall, and this week contributed to by Mr. Gouyard, I desire to interpose to suggest that a standardizing committee from the American Institute of Mining Engineers, if possible collaborating with the London Institution of Mining and Metallurgy, the Canadian Mining Institute and such other representative bodies as might be disposed to join in the work, should be appointed, to which the whole subject should be referred.

Some years ago the American Institute of Electrical Engineers appointed such a committee with the happiest results to professional terminology and incidentally to purchasers of electrical machinery. Recognizing that the conditions are very different and that the application of standard terms to mining and metallurgy is much more difficult than to any manufactured product, still I think mining engineers should use the same terms in the same sense; and all such suggestions as those of Mr. Argall—which are no doubt a small portion of those which could be made if there were a body with power to act—should be made to such a committee as that which I suggest.

Perhaps that committee, if appointed, might also deal with such questions as uniform methods of sampling, now being treated by Mr. Rickard.

T. J. JOHNSTON.

New York, March 21, 1903.

BRIQUETTES IN GERMANY.—The Laurahütte Gesellschaft is about to put in a briquette-making plant at its works at Kattowitz, Silesia.

MINER'S PHTHISIS.

By T. LANE CARTER.

"Miner's Complaint" is the name given, by most people, to the disease which carries off so many miners here at Johannesburg, but the more scientific medical men name it "Miner's Phthisis." Never before has this malady received the attention now being given to it. Although the death rate among miners was high before the War, it is only recently that the prevalent cause has been assigned. As I am not a medical man I cannot give an accurate account of the physiological features of it. Suffice it to say that, in some respects, it resembles ordinary consumption, but, fortunately for the victim, it is fatal sooner, and until the last stages are reached there is not much pain. Different individuals break down in various ways. Some I have seen gradually waste away, working until they nearly dropped, while others, endowed by nature with great constitutions, have worked on for months, apparently in good health, until the collapse came suddenly.

In the early stages of the disease there is hope for recovery. One miner, whom I knew, contracted the malady just as the war broke out, and went home to consult a specialist. By a course of rigid treatment, exercise, open air life, etc., the man's life was saved, although he was forced to give up underground work and take a job on top. Certain managers give occupation on the surface to miners who are thus affected, but the number of such jobs is limited, so that all men who have the trouble cannot be provided for in this way.

A suggestion has been made that miners in the first stages of the disease be given employment in the open veldt, in prospecting or farming work. If farms are opened in this region on a big scale, this scheme might prove feasible.

He is a hard-hearted man who can walk through the mines and see some of these miners, doomed to die in a little while, without feeling sorry for them. When you ask why they do not stop work they mournfully ask what are they to do, mining being the only trade they know anything about. Some have families depending on them, and work on and on, until they can do so no longer.

The doctor's advice to many a strong young fellow, who goes in for rock-drill contracting, allured to the work by the high pay, is to make all the money he possibly can for 2½ years, then to stop running rock-drills forever. It is after that time that the danger seems to increase.

I am glad to say that those in authority here are keenly awake to the evil, and steps are being taken to put up a valiant fight against the disease.

Some time ago a commission was appointed to investigate the question of miner's phthisis, and much interesting information has already been collected. When it becomes known how short comparatively is the time that a miner remains efficient, many will, I think, be startled. The superintendent of one big property, who was asked by a physician to collect statistics on the subject, reported that he considered seven years' steady work in a Johannesburg gold mine would kill most rock-drill men. There are some exceptions, of course, men who have been working on rock-drills here for ten years, but there are not many.

In order to encourage practical men in the solution of this vital problem, liberal prizes are offered by the commission. The first prize is £500 and a gold medal; the second is £250, and the third £100. Not only are these prizes open for competition on the Rand, but foreigners are invited to try, sending their plans to branch offices in London and Paris. From this it will be seen that the danger is being grappled with.

It would be of interest, I am sure, to obtain comparative statistics from other parts of the world, say, from the Western States. If some one would write an account for the ENGINEERING AND MINING JOURNAL, of the dust problem in the quartz mines of the States, stating how quickly the dust affects the miners, and what measures are taken to cope with it, I am sure the many Transvaal readers of your paper would read the account with keen interest.

STOPING IN A WITWATERSRAND MINE.

Of course, it should be remembered that in these mines more rock-drill mining is done than is the case, perhaps, in any other mining region; in fact, just now practically all rock is broken with rock-drills, and this in some measure might account for the great amount of dust in the underground workings. Is it possible that a miner can follow his arduous calling longer in other parts of the world, because the mining is principally done by hand labor?

It is now agreed that miner's phthisis is primarily due to the inhalation of fine particles of dust, which lodge in the lungs. There are a

number of secondary causes, however, which probably play an important part in undermining the workmen's health. A mechanical engineer of a big mine gave it as his opinion the other day that the amount of oil used has something to do with the trouble. Not only does the oil from the compressor plant get into the compressed air, but in the mine itself the miners use considerable oil, for lubricating the air-chest and cylinder of the drilling machines. Their method is to pour oil into the inlet, and as the compressed air comes through, it carries the oil through the machine, until it exhausts into the stope. This oil-impregnated air is breathed by the miners, and it is held that the oily vapor has a tendency to collect the dust and cause it to settle more freely on the lungs. A scheme for doing away with this oil is under consideration.

For the first time within my knowledge, careful investigation is being made of the air-supply underground. In no mine here, as far as I know, is artificial ventilation resorted to, as the natural ventilation is considered sufficient. The use of so many air-drills undoubtedly greatly helps to freshen the air, and in some of the distant working faces, is practically all the ventilation to be had. It is safe to say that each drill gives nearly 100 cu. ft. of air per minute; but in spite of all this, there are some who declare that the insufficient ventilation has something to do with the present difficulty. For this reason a good deal of investigation is being directed to the air supply. Certain mines show less than the amount required by law, which says "not less than 70 cu. ft. of fresh air per minute shall be provided in the intake for each and every person employed underground, and as much more as circumstances may require." Some mines come up to this amount, while few are found to exceed it. Whether some of them will be forced to resort to artificial ventilation, I am unable to say.

Another indirect cause of miners losing their health, is dynamite. Sometimes the miner goes back to blast twice, and even if he waits a good while after the last shot is fired, there is always danger of his being "gassed." As a rule, the dynamite used here is all that can be desired; occasionally, however, this is not so. In a certain instance, which came to my knowledge, a big consignment of blasting gelatine arrived, and the workmen were required to use it. In a few days every rock-drill man complained of terrible headaches after working hours. Next day the miners did not touch the gelatine, but ordered the Kaffirs to place the sticks in the holes for them; in spite of this precaution they still had bad "heads" at night. This dynamite evidently gave off obnoxious gases, and although it is cheap, I doubt if another consignment will be bought.

As dust is the primary cause of miner's phthisis, it is natural that it is receiving the most attention. It looks as if the idea of respirators will not be as satisfactory as has been hoped, for at the best of times a respirator is a nuisance, and the men do not like wearing them. "Prevent the dust from rising," is the most popular dictum just now.

The only way to prevent the dust from vitiating the atmosphere is by the free use of water. Some mines here have practically no water. How they will solve the difficulty, I do not know. In these excessively dry mines it makes one really nervous to work, when the danger from dust is known. In the course of shoveling great volumes of dust get into the air.

Some properties have a fair supply of water, which can be utilized at times. For instance, in a certain mine recently a steep raise had to be put up 100 ft. On the level above this raise there is a spring. This spring was dammed up, and pipes were laid to the working face in the raise below. A hose and tap were placed on the end, and the contractor made free use of the water. The difference was very marked, and he finished the 70 ft. of raising without inconvenience.

Several contrivances have been invented to solve the dust problem. One of them is a spray, worked from the exhaust air, which forces the water from a small pail, against the rock being drilled. It answers the purpose fairly well, but I fear the average miner will find it too much trouble.

People are beginning to realize that the rock-drill men are not the only ones liable to contract miner's phthisis, and that every man in the mine, if he remains long enough, is apt to contract the malady. To see the shovelers at work in a dry dusty stope makes one realize the danger from dust to every man underground. All the rock in the stopes should be watered before shoveling commences, but no mine, I fear, has water enough for this purpose.

The miners are frequently to blame for the illness which befalls them, for they neglect to use the very devices provided for their safety. This carelessness on their part, however, does not exempt those in authority from doing all in their power to minimize the death rate in an occupation which will always remain one of the most dangerous, in spite of all precautions.

RECENT LITERATURE ON BUILDING STONES.*

By EDWIN C. ECKEL.

In a recent number of the *Journal of Geology*, Messrs. Cross, Iddings, Pirsson and Washington have proposed[1] a new system for the classification and nomenclature of igneous rocks. While the proposed system may mark a great advance in petrography, it is based upon criteria which cannot be applied in field work, or by any one save the specialist in petrography. The authors, recognizing this fact, included in their paper several pages of discussion on the subject of rock names for general field use.

To the present writer it seems highly desirable that field geologists should unite upon some system of classification and nomenclature for the rocks commonly used for structural purposes. At present considerable diversity exists, as will be seen on examining a number of reports, by different authors, on the various quarry industries. In such a system trade names and distinctions should be preserved as far as possible, except when they convey entirely false ideas as to the character of the rock.

Descriptions of Quarry Districts, etc.—In addition to papers published in journals devoted to the stone trade and allied subjects, a number of reports on the quarry industry of various areas have been published by different State geological surveys. Such of these as have been brought to the writer's attention are noted below.

Watson[2] discusses the geological relations of the Georgia granites, with incidental notes of economic importance. A bulletin by the same writer on the "Granites of Georgia" is in preparation, and will be published by the Georgia Geological Survey this year. This bulletin will contain a detailed discussion of the quarry areas and of the economic relations of the product. McCallie[3] describes the road-building materials of Georgia, stating that the most serviceable materials are limestones and cherts, obtained mostly from the Knox dolomite, though occurring in other Paleozoic formations.

Nevius[4] gives detailed descriptions of the New York slate quarries and quarry methods and a discussion of the general features and condition of the industry. The quarries now worked are located along an approximately north-and-south line extending from the Hampton (variegated) quarries on the north, through the North Bend, Middle Granville, and Granville (red), the Slateville (red and green) and the Salem, Shushan and Cambridge (purple and green) quarries. The East Whitehall (Hatch Hill) quarries are west of the northern end of this belt. The red and green slates are cut to size at the mills. The mottled slates, being unsalable in their natural condition, are "marbleized," an enamel being applied to give imitations of marble, etc. The fragments and chippings from the slate mills are finely ground and used as "mineral paint."

Frear[5] discusses lime in its relations to agriculture, but gives also very satisfactory accounts of limestones (in general) and lime-burning; together with 273 analyses of Pennsylvania limestones used for either building stone or lime.

Ihlseng[6] describes road materials in general, their qualities and testing; the influence of topography on road location and construction; the methods of constructing and repairing roads, etc. Notes on the relative values of various Pennsylvania road materials are given, together with a section on the distribution, by counties, of such materials.

Peck[7] describes the serpentine of the Easton (Pa.) quarries as resulting from the alteration of the ferromagnesian silicates occurring in a highly crystalline limestone of pre-Cambrian age. One particularly attractive phase of the material quarried consists of serpentine containing numerous scattered crystals of rose-colored dolomite.

Harris and Veatch[8] briefly discuss the stone resources of Louisiana, comprising sandstones and limestones. The ferruginous sandstones of the Eocene and La Fayette are widely distributed, but unimportant as structural materials. Siliceous sandstones occurring in the Grand Gulf series are of greater importance, and have been used in jetty construction and for railroad ballast. Limestones of Cretaceous age outcrop at Winnfield, Coochie Brake and Bayou Chicot. The first is a pure limestone useful for lime, but too fragile for building stone. The other two are of fair quality for structural purposes. Limestone concretions in the Tertiary beds are of local importance for lime and road metal. Gravels of La Fayette age are extensively used as road metal and railway ballast.

Eckel[9] discusses in some detail the stone resources and quarry industry of southeastern New York, the more important materials of the area being trap, granites of several types and the well-known Tuckahoe or Pleasantville marble.

AN ENGLISH ELECTRICAL PLANT.—The Tredegar Iron and Coal Company has installed at its collieries a large electric power plant for haulage and pumping purposes. The whole of these collieries, which are situated in the Sirhowy Valley, Monmouthshire, are now equipped with electric haulage underground, both main and tail and endless rope, and the pumping, which is very considerable, is also done entirely by electric power. The generating plant consists of two 300-h.p. engines, and three-phase generators at Ty Trist Pits, with an overhead transmission line at 2,000 volts pressure from Ty Trist to the Bedwellty Pits, a distance of about 1¼ miles. The plant, which is the largest of its kind in Great Britain, has worked without a hitch from the commencement.

---

* U. S. Geological Survey, Washington, D. C.

[1] W. Cross, J. P. Iddings, L. V. Pirsson, and H. S. Washington. "A Quantitative Chemico-Mineralogical Classification and Nomenclature of Igneous Rocks." *Journal of Geology*, Vol. 10, pp. 555-690, 1902.

[2] T. L. Watson. "The granite rocks of Georgia and their relationships." *American Geologist*, Vol. 27, pp. 199-225.

[3] S. W. McCallie. "Preliminary report on the roads and road-building materials of Georgia." *Bulletin* 8, Georgia Geological Survey, 264 pp.

[4] J. N. Nevius, "Roofing slate quarries of Washington county, New York." *Nineteenth Report* New York State Geologist, p. 135-150.

[5] W. Frear. "The use of lime upon Pennsylvania soils." *Bulletin* 61, Pennsylvania Department of Agriculture, 170 pp.

[6] M. C. Ihlseng. "The road-making materials of Pennsylvania." *Bulletin* 69, Pennsylvania Department Agriculture, 104 pp.

[7] F. B. Peck. "Preliminary notes on the occurrence of serpentine and talc at Easton, Pa." *Annals*, New York Academy of Science, Vol. 13, p. 419-430.

[8] G. D. Harris, and A. C. Veatch. "Stone in Louisiana." *Report* Geological Survey of Louisiana for 1899, p. 129-132.

[9] E. C. Eckel. "The quarry industry in southeastern New York." *Twentieth Report* New York State Geologist, p. 142-176.

A FURTHER DISCUSSION ON ORE DEPOSITS.

SPECIALLY REPORTED FOR THE ENGINEERING AND MINING JOURNAL.

On February 25, at a meeting of the Geological Society of Washington, held at the Cosmos Club, the subject of a genetic classification of ore deposits was again made the topic for discussion. Mr. C. W. Hayes presided. The discussion was opened by Mr. S. F. Emmons, who said:

At the meeting of January 14 a discussion was commenced on genetic classification of ore deposits, a discussion which could not be completed because of the limited time, and further because several of our members who were entitled to speak with great authority on the subject were not present; and it is proposed at the present meeting to resume the discussion and to give an opportunity for those members to express their views. It was not supposed at the start that a purely genetical classification would be one that could be adopted in practical work, and many of us feel that we know as yet too little about ore genesis to attempt such a classification as would have any finality; but we do feel that the presenting of one or more tentative schemes on this basis will have a useful effect in clarifying our ideas, in promoting an interchange of views, and perhaps also in helping us in our field observations by indicating phenomena that it is important to recognize in the course of underground studies.

Two tentative classifications were proposed at the previous meeting by Messrs. Weed and Spurr, in which the authors have given much greater importance to the direct action of eruptive agencies in producing ore deposits than has hitherto been ascribed to them by most American writers on the subject. The question of the *ultimate* origin of the metallic minerals which go to make up our workable ore deposits is one which involves much that is purely speculative and beyond the reach of actual proof or demonstration in the field. Moreover, it has been, as I conceive, a characteristic of American investigators on ore deposits, as contrasted with their European colleagues, that they have based their conclusions with regard to genesis more on actually observed facts in the field than on laboratory studies and theoretical reasoning. For instance, as a pupil of Elie de Beaumont, I was taught that vein formations were the result of emanations from igneous rocks under the influence of certain mineralizing agents—the dying phases of eruptive activity. When, however, I took up the study of ore deposits in the field, applying to that study the methods employed in the observations of other geological phenomena and endeavoring to keep my mind free from the bias of any preconceived theories, I failed for a long time to find any evidence that would support the igneous emanation theory in the deposits I had opportunities of studying. In the condition in which they were then found they appeared to me evidently the result of concentration by circulating waters. As to their ultimate origin, I conceived that the greater part had probably been brought within reach of these circulating waters by igneous magmas as they proceeded upwards from the interior of the earth, but that these magmas had cooled and consolidated before the concentrations had taken place, since the rock-fractures which had afforded the trunk channels for the concentrating solutions were in most cases subsequent to that consolidation. In more recent years, when our field of study has widened and the number of workers (lamentably few in the early days) has greatly increased, actual field demonstration has become available that a certain class of deposits are probably the result of direct emanations from cooling igneous rocks, and others may be actual segregations in an igneous magma during the process of cooling. Such practical demonstrations of views that previously rested upon an almost theoretical basis have naturally excited great interest among students of ore deposits, and it is eminently desirable that their field should be as widely extended as possible. On the other hand, it is wise to guard oneself against the attractiveness of what appears to be novel, and hence presumably an advance on previously conceived ideas, and not to confound speculative assumption with demonstration. Herein lies an actual danger in the effect of this kind of speculation. Men may be led to assume for a given ore deposit, with regard to whose genesis they have really no direct evidence, an origin that accords with the latest speculative views, and such assumption may later acquire the standing of a demonstration.

Some of the instances which both Weed and Spurr quote as examples of the class of siliceous magmatic segregations come under this head. I have particularly in mind the quartz veins of Belmont, Nevada, quoted by Mr. Spurr, since his statement is based upon my own observations made as far back as 1868. While I should be unwilling to state from a recollection of so far distant observations that such an origin is impossible, Mr. Spurr's statement is purely speculative, since he could not examine the veins in question; yet they are very likely to be quoted by some later writers as examples of this very doubtful class, in the same manner as Weed has quoted Spurr's Alaskan quartz segregations, of whose orgin the latter seems to have equally little demonstrable proof. Whether it is justifiable to extend pneumatolytic agencies as far as these gentlemen have done depends primarily upon a question which it seems difficult to bring within the range of actual or even experimental demonstration; namely, whether igneous magmas as they come from the interior of the earth contain sufficient water to produce the phenomena observable in our ore deposits.

In a recent paper on Hot Springs, Prof. Edward Suess, the eminent geologist of Vienna, takes the affirmative side of this question, dividing hot springs into those whose waters rise under hydrostatic pressure, and those that derive their waters from the interior of the earth, the latter being characterized by their intermittence. With regard to the steam emanating from volcanic eruptions, he comes to the following conclusion:

"Volcanoes are not fed by the infiltration of ocean water, but ocean water receives additions to its volume by every (volcanic) eruption."

Prof. J. F. Kemp, of Columbia College, has been the first among American writers on ore deposits to argue in favor of the sufficiency of the supply of water that may be furnished by eruptive magmas, and we shall be glad to learn from him any facts that may bear upon this question.

Prof. James F. Kemp proceeded to say:

The early schemes for the classification of ore deposits were chiefly based on shape and texture, after the fundamental difference between interbedded deposits and veins in fissures had been once established; but as time has gone on principles of origin have come more and more to the front. It is now a question of the relative importance which is to be assigned to geological structure on the one hand and to source of ore and agent of introduction on the other. Geological structure is generally safe and involves less assumption, but as regards derivation and agent we are now in a position to speak in some instances with assurance. While in the past attention has been specially directed toward the normal circulation of ground-waters of meteoric origin, more recently we have had emphasis placed especially on the igneous phenomena. To Messrs. Lindgren and Weed we owe a great debt in this particular, and especially to the latter for the formulation of the scheme of classification under discussion.

As a general principle groups in schemes of classification should be based upon certainties, and, so far as possible, should not be capable of two interpretations. We may set aside the group of igneous, magmatic segregations, as a type whose origin admits of no argument. Titaniferous iron ores are its most important representative. Corundum and chromite are known in the same relations. That the pyrrhotite-chalcopyrite ores are of this type is doubtful, as has been shown by Lindgren for those at Rossland, and recently for the Sudbury ores by one of my students, C. W. Dickson, in a thesis, which was read before the American Institute of Mining Engineers at the Albany meeting.

At the other extreme we may also set aside the superficial placers and related residual deposits, since they involve no uncertainties. For the rest we may start with contact deposits, especially as produced by the action of eruptives on limestones; and with pegmatites which are certainly the effects of expiring igneous phenomena, and pass from these points of departure through veins and other forms of ores and reach the undoubted results of deposition from meteoric waters at the other extreme. In the interval between the extremes, where doubt arises as regards interpretation, it is best to fall back on the assured facts of attendant geological structure as the foundation of the type.

It is strange that the importance of contact zones of garnet, vesuvianite, wollastonite, epidote and copper ores with gold went so long without appreciation of their true nature. Although for some years correctly interpreted in Norway and described in the Norwegian reports, Mr. Lindgren's paper on the ores of the Seven Devils District of Idaho, and of others of related character, first brought them to American attention, but we have learned of many since, as at Cananea and San Jose, in Old Mexico and San Pedro, New Mexico. With the last two I am most familiar, and at each there are acres of garnet rock which has been produced from nearly pure limestone by the addition of silica from the eruptive, undoubtedly while highly heated. The change at Cananea and San Pedro has followed individual beds for long distances and no one can fail to be impressed with the enormous amount of silica which has been supplied in connection with watery vapor or its dissociated gases and probably other mineralizers. Had not this silica been caught and locked up near the eruptive, as it would not have been in walls of almost any rock other than limestone, we would have had very great veins produced in overlying strata. This is, in my opinion, the method by which many veins have been formed, even though the stimulating eruptive is not exposed to sight.

I have recently had the privilege of reading a very valuable contribution (still in manuscript), upon the "Gold Deposits of North America," by Mr. Lindgren, and submitted to the American Institute of Mining Engineers. In it he shows that after several geological periods—it may be even after geological eras—of no vein formation, the latter suddenly and for a brief period became very active, following igneous outbreaks. It then died away. Lindgren attributes the activity to the eruptive rock, and I think he is right. Eruptive rocks certainly accompany great upheavals, and extensive fracturing, and some may claim, with more or less reason, that they have merely furnished the propelling energy and the vein-minerals to circulating meteoric waters, but I incline rather to believe them not only the source of the energy and the minerals, but largely of the watery vehicle itself, a view that has claims to confidence, equal, if not superior, to those put forth for meteoric waters. Thus we find no vein-formation through enormous extent of time when conditions were favorable to meteoric waters and suddenly the outbreak of eruptive rocks starts it up. I am therefore in full sympathy with the tendency shown in Mr. Weed's scheme of classifi-

cation, and with the importance placed by it upon the igneous factors.

There are other considerations regarding ore-deposits which are of importance and of interest, but which have no place in a scheme of classification. They need to be understood by the miner, but they are not fundamental; for example, the enrichment of veins near the water level or for short distances below it, by the leaching of the upper portions in the descent of the surface waters. Certain peculiar mineral aggregates are characteristic of these enrichments, such as chalcocite and the distinctive silver minerals, but it is also true that the richest ore in mines may lie 3,000-3,500 ft. down the slope or shaft, as at Przibram and Grass Valley. Nevertheless, geologists are under great obligations, more especially to Mr. Weed, for emphasizing these relations.

It must not be forgotten that in regions physiographically old, we only have left the stumps of veins which may have once extended considerably higher. At the same time in connection with matters of genesis, the root is more important than the trunk and limbs.

In general, the more sound geology that can be worked into systems of classification and into terminology, the more helpful they will be to engineer and geologist. The closer we keep in touch with the miner and with the hard facts of his experience the more justification for the existence of geology. There is no geologist who may not profit by the experience of an observant and grizzled veteran of the pick and drill.

Mr. F. L. Ransome was the next speaker. He said:

In a recent paper on ore-deposits, Prof. Vogt has remarked that "the precise tracing of the boundary between eruptive after-action and the work of the underground waters, is a labor for the future." It is a question whether the genetic classification proposed at a recent meeting by Mr. Weed has in any way curtailed this field of future investigation. That the time is hardly ripe for a satisfactory genetic classification of ore-bodies is shown not only by the widely divergent views held by eminent students of the subject, but by the trend of the present discussion which insistently transgresses its implied limits, to concern itself with the underlying processes of ore-deposition, rather than with the grouping of accepted types of known origin.

I shall try to point out briefly what seem to me to be some objections to the plan of classification adopted by Mr. Weed and to illustrate these objections by reference to ore-deposits with which I am familiar.

The use of the critical temperature as a criterion of classification gives to the scheme an attractive appearance of precision, which, however, is more apparent than real. For it implies that contact metamorphism ceases and entirely different processes come into play the moment the magma cools below the temperature of 365° C. As a matter of fact, however, water (which is admittedly the chief agent concerned in mineralization) will still exist as a vapor below the critical temperature, provided the pressure be not excessive, and it is yet to be proved that substances given off from the magma above their critical temperatures are the only agencies capable of producing the minerals characteristic of contact zones.

While it is admitted that molten magmas contain various substances that may be given off in the state of gas or vapor when the magma is erupted near the surface, it is a debatable question whether the magma is so saturated with these substances as to give them off in abundance under great pressure, and above the critical temperature. The fact that granite when heated to 1,000° C. was found by Gautier to give off more than 100 times its own volume of gases and vapors shows that under the conditions of original solidification these gases were *retained* in the rock.

Part of the argument in favor of a pneumatolytic origin for certain ore-deposits is drawn from the well-known effect of mineralizing agents in the artificial production of minerals by synthesis. The mineralizing agent in most cases, however, either does not enter into the composition of the mineral formed, or does so in very small amounts. An ore-body on the other hand implies a local concentration of materials elsewhere very sparingly present in the rocks. It cannot be explained as the result of crystallization of material already provided, in the presence of some mineralizing agent given off from a contiguous body of molten magma. It implies extensive transfers of material, and it is this considerable concentration and transfer which I find most difficult to ascribe entirely to pneumatolytic processes, particularly when it is remembered that one of the characteristics of ordinary contact metamorphism is a surprisingly slight change in the chemical composition of the metamorphosed rock. The case of the garnetized limestone of San Jose in Mexico, cited in a recent paper by Prof. Kemp, is not clearly an exception to this statement. His argument for the original purity of the limestone, and the consequent introduction of material to form the garnet, is based upon smelter records. But it is not unusual to find that the metamorphism of an impure limestone is a clarifying process resulting in the formation of garnet and pure crystalline calcite. Moreover, smelters as a rule seek the purest limestone for fluxing purposes. At Cananea, for example, where extensive garnetization of the limestone has taken place, the limestone for smelting purposes is brought from a distance and from a bed that cannot be taken as representing the original character of the limestone before metamorphism.

The entire subject of pneumatolysis is one of great interest, and there would seem to be here a field for extensive experimental work. The difficulties in the way of such experiments, involving great pressures, high temperatures and time, are formidable, but perhaps not insurmountable. It is one of many lines of scientific investigation awaiting the happy conjunction of the right worker and an available fund.

It is over the fourth class of Mr. Weed's table —the gas-aqueous or pneumato-hydato-genetic deposits that there will probably be most difference of opinion. One may admit the action of pneumatolysis in the formation of some contact deposits and yet hesitate to extend the hypothesis to most of the deposits grouped under Class IV, which comprises the greater number of workable metalliferous ore-bodies. It is generally admitted that water has been the vehicle by which these ores have been deposited. So much may fairly be deduced from the observable facts. The question whether this water is mainly meteoric or has been expelled from solidifying masses of eruptive rock approaches, at present, the ground of speculation, and with the hypothesis that gases given off from igneous rocks are directly mingled with the ore-depositing solutions, that ground is fairly entered. My own limited experience has rather inclined me to the view that most of the ore-bodies grouped under Class IV have been formed *after* the solidification of the eruptive rocks with which they are more or less closely associated, and that the principal agent in their concentration and deposition has been meteoric water.

In the Sierra Nevada of California, in what is known as the Mother Lode District, the gold-quartz veins belong to the sericitic-calcitic class as defined by Lindgren, are Cretaceous in age. The great eruptions of granodiorite also belong to this same period. But the veins are distinctly later than the granodiorite, and in many cases occupy fissures in the latter rock. The granodiorite had therefore solidified before the ores were deposited, and any direct participation of pneumatolytic processes is barred out as far as known intrusive masses are concerned.

The San Juan region in Colorado has been frequently cited in illustration of vein-relationships, which, as far as that region is concerned, are entirely imaginary, and which can generally be traced to the fanciful writings of Prof. T. B. Comstock. Thus the authors of two recent papers discussing the relation between ore-deposition and igneous activity, have referred to the region as containing three distinct sets of veins, each set characterized by ores of different mineralogical character. As I have elsewhere shown, this distinction has no basis in fact, and is a case of hasty generalization from very incomplete data. The lodes of the Silverton quadrangle, in this region, which are generally associated with propylitic alteration of the country rock, are not only later than the great series of volcanic lavas and tuffs, but are later than the monzonitic intrusions that invade the volcanics. Many of the lodes occur in fissures which cut the monzonites and the mineralization took place subsequently to the solidification of all the eruptive rocks known in the region.

In the Rico Mountains, Colorado, there are some deposits in Devonian limestone, which consist of pyrite, chalcopyrite, sphalerite, galena and specularite, associated with garnet, wollastonite, chlorite and pyroxene. These, although not now observably in contact with intrusive rock, are probably to be classed as true contact deposits, and are possibly, in part, of pneumatolytic origin. But the lode and blanket deposits of this district are distinctly later in age than the intrusive masses of porphyry, and were formed after the solidification of the latter. The porphyry itself is often extensively mineralized.

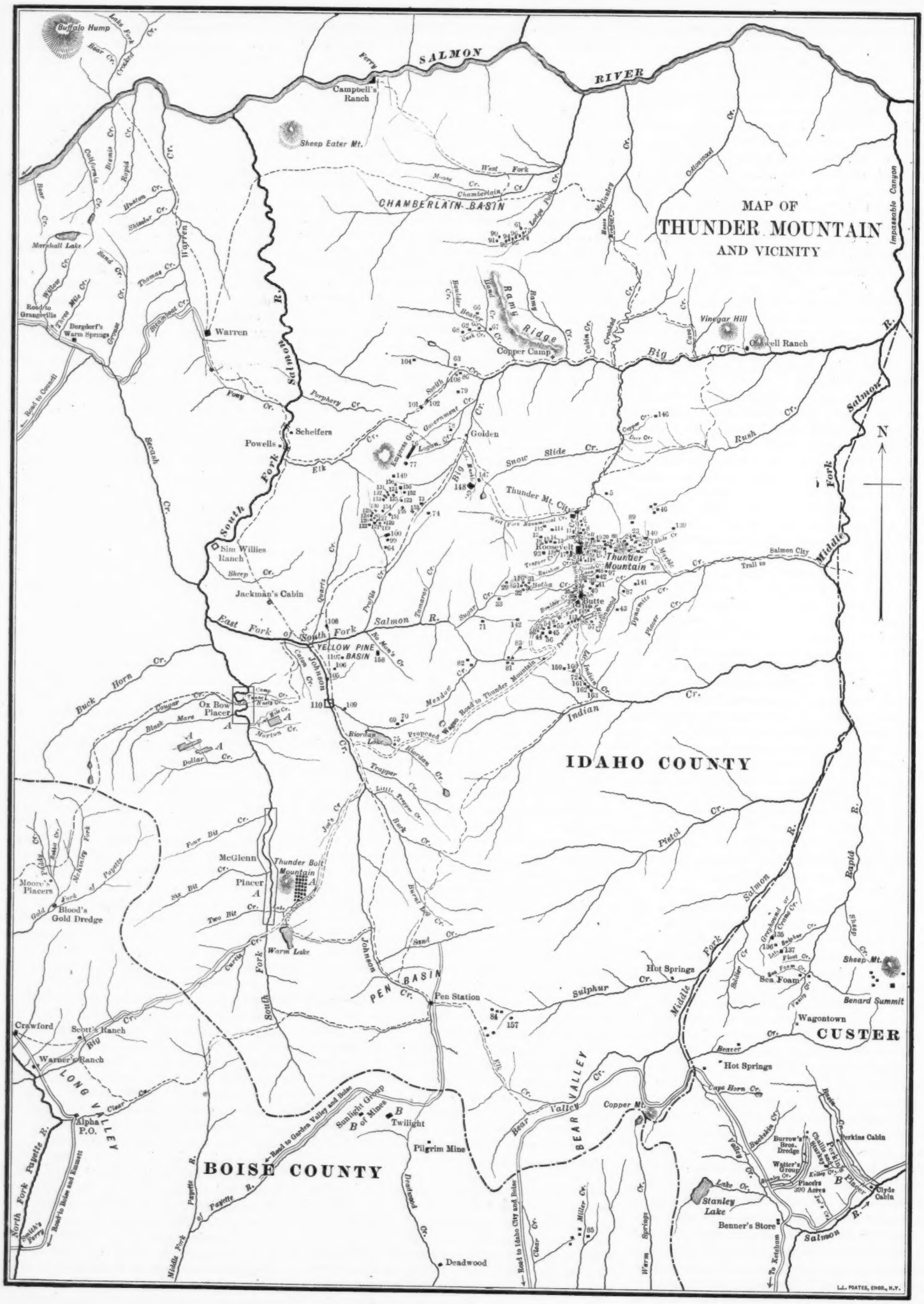
The copper deposits at Globe, Arizona, originally pyrite and chalcopyrite, were deposited after extensive intrusions of olivine diabase. The ore occurs chiefly in limestone, quartzite and in the diabase itself. The ores in the diabase have the form of veins or lodes, and were evidently formed after the diabase had solidified and had been greatly faulted.

In the Bisbee District, Arizona, the principal ore-bodies occur as replacements in limestone adjacent to an intrusive mass of granite porphyry, and related also to faults cutting the limestones and older rocks. The limestone shows very little evidence of contact metamorphism. The original ores, from which the workable bodies have been formed by oxidation and by sulphide enrichment, consist of pyrite and chalcopyrite. They occur chiefly in the limestone, but the entire mass of porphyry is altered and abundantly impregnated with pyrite, sometimes accompanied by chalcopyrite. Here again the mineralization is apparently later than the solidification of the only known eruptive rock to which it bears any relation.

In conclusion, I do not wish to deny that pneumatolysis may be an effective factor in ore-deposition, but there seems to be a tendency to carry this attractive and suggestive hypothesis a little further than the facts warrant. The few mining districts that I have studied have led me to regard the action of meteoric waters, usually heated and made more active physically and chemically by masses of intrusive rock, as more important and more far-reaching than indicated in the proposed genetic scheme of Mr. Weed, which has provoked the present discussion.

Mr. Hayes then introduced Mr. T. A. Rickard, who had been invited by the Society to attend the meeting in order to take part in the discussion. Mr. Rickard said:

It is evident that as yet there is no unanimity concerning the origin of ores, and until a certain degree of harmony of ideas has been attained no system of classification is likely to be generally accepted; nevertheless the classifications submitted by Messrs. Weed and Spurr have served a



MAP OF CENTRAL IDAHO, INCLUDING THE THUNDER MOUNTA IN DISTRICT.

most useful purpose in crystallizing their own views on genetic principles and in affording a clear field for discussion on the part of those who hold different opinions. "All knowledge," says Locke, "consists in seeing likeness and difference." That defines classification; by means of it we shall be able to analyze existing conceptions of the process of ore formation, so as to separate the points upon which we agree from those which we dispute and from the much larger array of facts concerning which no one possesses precise knowledge.

The discussion has emphasized the divergence of views between acknowledged authorities. Formerly, when mining did not know geology, both suffered thereby; when geology was an arrogant youngster and mining only a blind digger, it was fashionable to impute to igneous agencies and gaseous emanations the responsibility for the occurrence of ores. To this period, which lasted long, a sort of "dark ages" in the history of mining geology, there succeeded a recognition of the effects of water in depositing minerals within the earth fractures. Posepny's monograph represents the culmination of this philosophy, for when Prof. Van Hise elaborated his deductions from physical laws the tide of opinion had already begun to turn by reason of the researches of Vogt. Kemp, Spurr and Weed have driven home Vogt's conclusions, and by observation and discussion they have advanced the theory of igneous agencies until the aqueous factor is almost driven to the surface. Van Hise claimed for his domain a depth which reached at least six miles into the interior of the earth, now the advocates of magmatic differentiation propose to confine the agency of free water to a shallow strip somewhere near the surface. The theory of an aqueous deposition of ores is thus threatened by an igneous intrusion of a very violent kind.

The agency of water was at one time overlooked, that of magmatic differentiation was not recognized until lately, and as each branch of the subject had been elaborated the enthusiasm of its advocates has carried them beyond bounds. The swing of the pendulum just now is on the igneous side, by and by the pendulum will slowly fall back to a compromise of views, so that with each elaboration of this many-sided problem we shall gradually attain to a more comprehensive theory, capable at length of covering the multitudinous ways in which ores are found in nature.

The classifications proposed by Messrs. Weed and Spurr are extremely suggestive. To a large extent they are supported by the broad fact of an intimate connection between ore deposits and igneous rocks. The miner's fondness for an environment of "porphyry" may not be well reasoned, but it is the result of wide experience. It expresses a general phenomenon. A phenomenon is a thing we do not understand.

During the past three years I have been collecting data upon the geological distribution of the precious metals in Colorado. It is a remarkable fact that in this single mining region the profitable mines, exploiting gold and silver ores, occur within every geological terrain from the Archean granite to a Tertiary conglomerate; at this moment mining is going on in terrains belonging to all the principal subdivisions of geological time and amid a variety of petrographic environment which includes nearly all of the principal sedimentary and crystalline rocks. In arriving at the age of the country enclosing these lodes it has frequently been difficult to consider the sedimentary apart from the intrusive igneous rock, and it is not too much to say that there is not a mining district, among the sixty-five which I have tabulated, in which igneous rocks do not occur in close association with the ore deposits. Moreover, out of six hundred mines there are at least two hundred which have yielded ore from sedimentary rocks belonging to more than one geological period. Thus, any generalizations based upon the age or the composition of the country rock are completely shattered. This serves but the more to emphasize the fact, which is too general to be a coincidence, that the valuable ore-deposits are connected with the occurrence, in the vicinity, of intrusive igneous rock. I have been led to conclude that the deposition of ore represents the results of that thermal activity which is, as it were, the dying breath of volcanic activity, and that the dikes, sheets, cores and laccoliths were factors in stimulating the circulation of mineral solutions. Not that the igneous rock was the direct ore-carrier, but that it energized the chemical work of the solutions, and that it opened a subsequent passageway for such solutions, whereby they reached the locus of their deposit. As Mr. Emmons has observed already, it is likely that the igneous matter brought the metals within the region of water circulation, and that the actual concentration of ore which is exploited by man to-day was the result of the subsequent activity of the underground water system.

This brings me to a view of the subject which I have previously suggested. In discussing Posepny's paper in 1893, I used the simile of a domestic hot water system. Prof. Le Conte and Mr. Emmons have at various times referred to this analogy, as I used it, and I am therefore encouraged to apply it in a more comprehensive manner. Data afforded by mine workings indicate that a condition of rock-saturation does not persist indefinitely downward, but that there is a water zone, extending from the ground-water level for a further depth of several hundred feet. Below that horizon, which has limits varying with locality, whatever free water does exist is confined to definite channels, that is, vein-fractures similar to those in which we find the ore to-day. In depth we encounter vulcanism. Thus we have the elements of a circulatory system; heat at the base, a series of channels leading to surface and a reservoir of cold water at the top. It is not likely that gravitation is the main agent in giving movement to the underground waters; the decrease in density due to rising temperature must be offset against the friction of the rock walls, and it is probable that superheated water-vapor serves as the main propeling force, as is suggested by the testimony of volcanic action. Nor is it likely that the water is wholly of meteoric origin.

The deepest metal mines, in the Lake Superior region, are dry at the bottom; the deepest coal mines in Germany and England exhibit the maximum of dust; the deepest gold mine in the world does not need to use a pump; many mines in the dry regions of Australia are unhealthily dusty at a shallow depth; in the Transvaal, miner's phthisis is brought on by excessive dust in the air of the workings—these facts speak for themselves. It is useless to speak of rock-saturation by water in the face of them. Moreover, the heavy inflow of water in mines coincides usually with a comparatively shallow zone, the bodies of water encountered underground are eventually pumped out—so that there is plenty of evidence which is quite opposed to the conception of a water-soaked region of indefinite vertical extent. It is a matter which is worthy of consideration, because it affects the ideas which we form concerning the precipitation of ore from solutions in their approach to surface.[1]

(To be Continued.)

NEW RAILROADS IN SOUTH AFRICA.—The railroad extension conference in Johannesburg has agreed upon the construction of seven branches and extensions of the existing railroad system. They are intended to improve the connections between Johannesburg and the coal mines; between Johannesburg and Natal ports; and generally to open up the Transvaal. The total length of the seven lines will be 668 miles.

[1]This idea was subsequently set forth at greater length, under the title of "Water in Veins. A Theory," in the ENGINEERING AND MINING JOURNAL of March 14th, 1903.

A MINING MAP OF CENTRAL IDAHO.

We reproduce herewith a map of central Idaho, including Thunder Mountain and adjoining districts, in which a great deal of interest has recently been taken. Necessarily the map has been very much reduced in order to bring it within the limits of our page. The original is 24 by 36 in. in size, and copies can be obtained from James E. Dunbar, at Boise, Idaho, by those who find a use for it on a large scale. The map was prepared by Messrs. James E. Dunbar and M. F. Kirkpatrick, chiefly from original data secured by Mr. Kirkpatrick in the field.

We give the illustration herewith, thinking that it is well worth the space taken, as an example of good work in this line, which is of very great value to mining engineers, and others who may be interested. In addition to the mining districts it gives accurately the large area extending from the Boise Basin on the south to Salmon River on the north, and from the Seven Devils District on the west to Custer County to the east. We believe that no accurate map of this large area has ever been published before. In fact, a considerable part of the country has never been explored until quite recently, and the Thunder Mountain excitement was largely the cause of drawing attention to the region.

With regard to the Thunder Mountain District itself, we are aware that many varying opinions have been expressed, and undoubtedly too much was claimed for the district in the first excitement. We are informed, however, that in spite of this, progress is being made in the district, and while the excitement generally has subsided, and less is being said about it, more work is being done now than at any time since its discovery. Work is being prosecuted on about thirty different properties with forces varying from a few men up to twenty-five. There are over 250 men in the camp during the present winter, and it is probable that by next summer enough work will have been done to afford the basis for an intelligent opinion on its merits.

NICKEL COINAGE IN FRANCE.—The French Mint has been authorized by law to issue a new coin of nickel. This is the first use of that metal in a French coin, gold, silver and copper having been used for all purposes. The new coin will have a face value of 25 centimes, about equal to 5 cents. It will be of nickel, to be at least 930 fine; it will weigh 7 grams, and will be 24 millimeters in diameter.

AMORPHOUS SILICON.—It has been discovered by MM. H. Moissan and S. Smiles that the amorphous silicon obtained by passing sparks through the vapor of liquid silicon hydride possesses marked reducing properties which are not exhibited by the amorphous silicon prepared by Vigouroux; they consider the difference to depend on the state of division of the silicon. A similar phenomenon is found in the case of boron.

CO-OPERATIVE PUMPING IN ENGLISH COAL MINES.—The London *Iron and Coal Trades Review* says: "It is anticipated that a new lease of life and prosperity will be given to the coal trade of South Staffordshire by the proposed new pumping scheme of the South Staffordshire Mines Drainage Commissioners, which was under discussion last week, and has been adjourned for further consideration. This scheme is a combined steam, gas and electrical pumping undertaking, and it should enable the mine owners of the district to recover over 39,000,000 tons of coal in 11,290 acres of colliery area. The cost is estimated at £68,000, and the annual working expenses—less £2,000 for water sold to the canal company—will be about £11,650, the water raised amounting to 11,300,000 gallons per annum."

THE REPORT OF THE ANTHRACITE COAL STRIKE COMMISSION.

The Anthracite Coal Strike Commission, appointed by President Roosevelt, made public their report on March 21. This report, while condemning certain features of the strike and particularly the boycott and assaults on non-union miners, grants increases of wages and a reduction of working time per day. The Commission considered and passed upon a long list of demands made by the miners, summarized as follows:

I. An increase of 20 per cent upon the prices paid during the year 1901 to employees performing contract or piece work.

II. A reduction of 20 per cent in hours of labor, without any reduction of earnings for all employees paid by the hour, day or week.

III. The adoption of a system by which coal shall be weighed and paid for by weight, wherever practicable; the minimum rate per ton to be 60 cents for a legal ton of 2,240 pounds; the differentials now existing at the various mines to be maintained.

IV. The incorporation in an agreement between the United Mine Workers of America and the anthracite coal companies of the wages which shall be paid and the conditions of employment which shall obtain, together with satisfactory methods for the adjustment of grievances which may arise from time to time, to the end that strikes and lockouts may be unnecessary.

The report reviews the history of the anthracite industry, discusses the many peculiar and perplexing problems involved in mining, preparing and marketing anthracite, and after taking up the miners' demands in detail makes these awards:

I. That an increase of 10 per cent over and above the rates paid in the month of April, 1902, be paid to all contract miners for cutting coal, yardage and other work for which standard rates or allowances existed at that time, from and after November 1, 1902, and during the life of this award.

II. That engineers who are employed in hoisting water shall have an increase of 10 per cent on their earnings between November 1, 1902, and April 1, 1903; and from and after April 1, 1903, and during the life of the award, they shall have eight-hour shifts, with the same pay which was effective in April, 1902, and where they are now working eight-hour shifts, the eight-hour shifts shall be continued, and these engineers shall have an increase of 10 per cent on the wages which were effective in the several positions in April, 1902.

Hoisting engineers and other engineers and pumpmen, other than those employed in hoisting water, who are employed in positions which are manned continuously, shall have an increase of 10 per cent on their earnings between November 1, 1902, and April 1, 1903, and from and after April 1, 1903, and during the life of the award they shall have an increase of 5 per cent on the rates of wages which were effective in the several positions in April, 1902; and in addition they shall be relieved from duty on Sundays without loss of pay, by a man provided by the employer to relieve them during the hours of the day shift.

That firemen shall have an increase of 10 per cent on their earnings between November, 1902, and April 1, 1903, and from and after April 1, 1903, and during the life of the award they shall have eight-hour shifts, with the same wages per day, week or month, as were paid in each position on April 1, 1902; all employees or company men other than those for whom the Commission makes special awards shall be paid an increase of 10 per cent on their earnings between November 1, 1902, and April 1, 1903, and from and after April 1, 1903, and during the life of this award they shall be paid on the basis of a nine-hour day, receiving therefor the same wages as were paid in April, 1902, for a ten-hour day. Overtime in excess of nine hours in any day to be paid at a proportional rate per hour.

III. During the life of this award the present methods of payment for coal mined shall be adhered to unless changed by mutual agreement.

In all of the above awards it is provided that allowances like those made shall be paid to the legal representatives of such employees as may have died since November 1, 1902, and that the amount of increase for work done between November 1, 1902, and April 1, 1903, be paid on or before June 1, 1903.

IV. Any difficulty or disagreement arising under this award, either as to its interpretation or application, or in any way growing out of the relations of the employers and employed, which cannot be settled or adjusted by consultation between the superintendent or manager of the mine or mines, and the miner or miners directly interested, or is of a scope too large to be so settled or adjusted, shall be referred to a permanent joint committee to be called a board of conciliation, to consist of six persons, appointed as hereinafter provided. That is to say, if there shall be a division of the whole region into three districts, in each of which there shall exist an organization representing a majority of the mine workers of such district, one of said board of conciliation shall be appointed by each of said organizations and three other persons shall be appointed by the operators, the operators in each of said districts appointing one person.

The board of conciliation thus constituted shall take up and consider any question referred to it as aforesaid, hearing both parties to the controversy and such evidence as may be laid before it by either party; and any award made by a majority of such board of conciliation shall be final and binding on all parties. If, however, the said board is unable to decide any question submitted or point related thereto, that question or point shall be referred to an umpire, to be appointed, at the request of said board, by one of the circuit judges of the Third Judicial Circuit of the United States, whose decision shall be final and binding in the premises.

The membership of said board shall at all times be kept complete, either the operators' or miners' organizations having the right, at any time when a controversy is not pending, to change their representation thereon.

At all hearings before said board the parties may be represented by such person or persons as they may respectively select.

No suspension of work shall take place, by lockout or strike, pending the adjudication of any matter so taken up for adjustment.

V. Whenever requested by a majority of the contract miners of any colliery, check weighmen or check docking bosses, or both, shall be employed. The wages of said check weighmen and check docking bosses shall be fixed, collected and paid by the miners in such manner as the said miners shall by a majority vote elect, and when requested by a majority of said miners the operators shall pay the wages fixed for check weighmen and check docking bosses out of deductions made proportionately from the earnings of the said miners on such basis as the majority of said miners shall determine.

VI. Mine cars shall be distributed among miners who are at work, as uniformly and as equitably as possible, and there shall be no concerted effort on the part of the miners or mine workers of any colliery or collieries to limit the output of the mines or to detract from the quality of the work performed, unless such limitation of output be in conformity to an agreement between an operator or operators and an organization representing a majority of said miners in his or their employ.

VII. In all cases where miners are paid by the car, the increase awarded to the contract miners is based upon the cars in use, the topping required and the rates paid per car which were in force on April 1, 1902. Any increase in the size of car or in the topping required shall be accompanied by a proportionate increase in the rate paid per car.

VIII. The following sliding scale of wages shall become effective April 1, 1903, and shall affect all miners and mine workers included in the awards of the Commission.

The wages fixed in the awards shall be the basis of and the minimum under the sliding scale.

For each increase of five cents in the average price of white ash coal of sizes above pea coal, sold at or near New York, between Perth Amboy and Edgewater and reported to the bureau of anthracite coal statistics, above $4.50 per ton, f. o. b., the employees shall have an increase of 1 per cent in this compensation, which shall continue until a change in the average of said coal works a reduction or an increase in said additional compensation hereunder; but the rate of compensation shall in no case be less than that fixed in the award. That is, when the price of said coal reaches $4.55 per ton the compensation will be increased 1 per cent to continue until the price falls below $4.50 per ton, when the 1 per cent increase will cease, or until the price reaches $4.60 per ton, when an additional 1 per cent will be added, and so on.

These average prices shall be computed monthly, by an accountant or commissioner, named by one of the Circuit Judges of the Third Judicial Circuit of the United States and paid by the coal operators such compensation as the appointing judge may fix, which compensation shall be distributed among the operators in proportion to the tonnage of each mine.

In order that the basis may be laid for the successful working of the sliding scale provided therein, it is also adjudged and awarded: That all coal operating companies file at once with the United States Commissioner of Labor a certified statement of the rates of compensation paid in each occupation known in their companies as they existed April 1, 1902.

IX. No person shall be refused employment or in any way discriminated against on account of membership or non-membership in any labor organization; and there shall be no discrimination against or interference with any employee who is not a member of any labor organization by members of such organization.

X. All contract miners shall be required to furnish within a reasonable time before each pay day a statement of the amount of money due from them to their laborers, and such sums shall be deducted from the amount due the contract miner, and paid directly to each laborer by the company. All employees who paid shall be furnished with an itemized statement of account.

XI. The awards herein made shall continue in force until March 31, 1906; and any employee, or group of employees, violating any of the provisions thereof shall be subject to reasonable discipline by the employer; and, further, that the violation of any provisions of these awards, either by employer or employee, shall not invalidate any of the provisions thereof.

In its discussion of conditions in the anthracite region the Commission finds no justification for the statement that the annual earnings of the mine workers were insufficient to maintain the American standard of living. On the contrary, it finds that social conditions in communities made up of mine workers, the number and character of the public schools accessible and the proportion of churches are fully up to the American standard, and that opportunities generally for mental and religious instruction are adequate.

The contention that the wages of the miners are so low that their children are prematurely forced into the breakers and mills, is not sustained to the satisfaction of the Commission, and it also finds that the claim that the miners in the anthracite region receive a lower rate of wages than those in bituminous mines, is not supported by any testimony produced. On the contrary, the Commission finds that the average daily earnings of the anthracite miner do not compare unfavorably with those of men in other industries requiring equal skill and training.

The Commission considers that the practice of employing coal and iron policemen paid by the mining companies is of doubtful wisdom, as tending to create irritation. The testimony before the Commission proved that as a rule the coal and iron policemen employed during the strike were men of

good character. The Commission recommends that in place of the coal and iron police a regularly constituted constabulary be appointed and paid by the county or the State.

As regards the employment of children, the Commission finds that the age limit in Pennsylvania is not placed sufficiently high, and that existing laws ought to be more rigidly enforced.

The Commission is against compulsory arbitration in labor disputes, believing that such a system would not meet with general approval or success. It believes, however, that the State and Federal governments should provide the machinery for investigating controversies when they arise and the passage of a Federal act giving the President authority to appoint an investigating commission in case, in his judgment, at any time the free and regular movement of commerce among the several States and with foreign nations is interrupted or threatened with interruption by reason of controversies between employees and employers. A similar act is recommended for States not having the machinery for a rigid investigation of labor disputes.

In commenting on the demands of the United Mine Workers that the organization be recognized, the Commission finds that it does not consider the question of such recognition within the scope of the jurisdiction conferred upon it, but says: "The suggestion of a working agreement between employees and employers embodying the doctrine of collective bargaining is one which the Commission believes contains many hopeful elements for the adjustment of relations in the mining region." The Commission points out the necessity of labor unions acting with judgment and deliberation; it says that 20 per cent of the United Mine Workers in the anthracite region are boys, and pointedly remarks that "the present constitution of the United Mine Workers of America does not present the most inviting inducements to the operators to enter into contractual relations with it."

The Commission favors the organization of a labor union composed of anthracite mine workers, distinct from, but affiliated with, the United Mine Workers of America.

THE USE OF CARBIDE OF SILICON.*

The use of carbide of silicon in connection with the manufacture of steel has increased extensively in the past few years. It has been employed to some extent as a substitute for ferro-silicon. Manufacturers of steel castings were first to appreciate its value, particularly in basic open-hearth work. Much of such work, to insure solid castings, calls for a higher silicon content than can be secured from pig iron that comes within basic requirements. If the addition of ferro-silicon is made to the ladle cold too great chilling results, and it has been customary to melt it first in a separate cupola. In certain cases it has been the practice to add directly to the furnace, but this is accompanied by excessive loss of silicon by reason of its rapid action on the basic slag and to some extent on the basic lining of the furnace.

Carbide of silicon containing 62 per cent of available silicon is added directly to the ladle during the process of tapping and without previous heating. Uniform action is secured and complete solution generally takes place by the time the ladle is full. The carbide has also found large use in steel for various purposes that is first run into ingots, and in which the silicon is very much lower than in steel castings, amounting generally to but a trace. Manufacturers of tool steel have found that the freedom of carbide of silicon from phosphorus and sulphur offers great advantages, and it is therefore used in considerable quantities in the open-hearth practice of such manufacturers and to some extent in crucibles. Operators of the acid open-hearth process have used carbide of silicon in cleaning dirty furnace bottoms. When the hearth becomes crusted over a small quantity of carbide of silicon is sprinkled over it and on being heated sets up such a scouring action as to reduce the residue to fluid slag which is readily removed from the hearth.

In general foundry practice there has been little substitution thus far of carbide of silicon for high silicon iron, though as a means of reducing iron oxides in burnt iron and, in fact, all scrap, carbide of silicon is much the more effective. In ordinary cupola practice there has not been realized such advantage from the employment of carbide of silicon as might be expected considering its high silicon content. That steel foundries have had no difficulty is due to the much higher temperatures employed than in gray iron foundries, the addition of carbide of silicon being readily soluble in the ladle containing the molten steel.

* From the Cleveland *Iron Trade Review.*

THE TRAIL SMELTER, BRITISH COLUMBIA.

The Canadian Smelting Works, located at Trail, British Columbia, are owned by the British Columbia Southern Railway Company, which is operated by the Canadian Pacific Railway.

The plant is the largest lead-copper reduction works in Canada. The combined capacity is about 1,300 tons per day, of lead and copper ores. It is operated by electrical power, which is furnished by the West Kootenay Power Company, whose works are situated 30 miles distant on the Kootenay River. The line current is 20,000 volts, which is transformed to 550 volts at the smelter. There is a total of 1,000 horse-power in motors, divided into 16 units. In addition, there is a complete lighting plant, of both arc and incandescent systems, which furnishes the smelter and the town of Trail.

The smelter is operated entirely upon custom ores, which are purchased from all parts of British Columbia, and are of endless variety, necessitating most accurate sampling and care in handling.

Copper-gold ores, the greater percentage of which are from the Rossland mines, are low in copper, the principal value being in gold. These ores are delivered at the smelter in 30-ton hopper bottom dump cars, which discharge directly into large receiving bins in front of the copper sampling mill. The ore is drawn from the bins into transfer cars, dumped into a No. 6 Gates crusher, having a capacity of 100 tons per hour, and crushed to 3-in. size; the ore is then elevated by a large bucket elevator to the first automatic Vezin sampler. This sampler takes 17 samples per minute, and an amount equal to one-tenth of the entire lot. The sample from this machine is then crushed to 1½-in. diameter by a No. 3 Gates crusher, after which it passes No. 2 Vezin sampler, which takes 34 samples per minute, or one-fifth of the original sample, being one-fiftieth of the original lot. This sample is again reduced by crusher and rolls to ¼ in., after which it passes the third Vezin, taking 42 samples per minute, and one-tenth of the second sample, or one-five-hundredth of the original lot. This sample is further rolled and divided by Jones riffles, until it weighs about 20 lbs. It is then taken to the assay office for further crushing and reducing. The ore from the mill is either taken to the roasting yard and roasted in heaps of 3,000 tons each, or transferred direct to the blast furnace charge bins.

As the plant is built on a sloping site, every advantage is gained by gravity, which reduces elevating and shoveling to a minimum, leaving nothing but final products to be elevated. All transferring and hauling is done by electrical locomotives of 10 horse-power each.

There are three large copper furnaces, with about 900 tons capacity. The ores and fluxes are fed directly from cars into the furnaces, hand feeding having been dispensed with.

The first matte produced contains 10 to 12 per cent copper. This is granulated and roasted in O'Harra furnaces, of which there are two. The calcine is then briquetted and re-smelted, the resultant matte running 50 to 55 per cent copper. This matte is shipped to the United States for converting and refining.

The lead ores are obtained from all parts of the Province, and are principally sulphides, with high silver values. The ores received are mostly sacked and shipped to the smelter in box cars.

The lead sampling mill consists of a 10 by 20 Blake crusher, in which the product is crushed to about ¾ in. diameter. It is then rolled, elevated and screened. The over-size is again rolled and elevated to the same screen. The screen is ¼-in. mesh, and all sulphide ore is passed through it before passing through the first Brunton sampler, taking 10 samples per minute, or one-twentieth of the lot. The sample then enters a revolving cylinder or feeder, to insure a constant flow of ore to the final Vezin sampler, taking one-tenth of the first sample, or one-two-hundredth of the original lot. This sample is further cut down by Jones riffles, until about 20 lbs. weight, when it is taken to assay office for further treatment.

The lead ores are roasted either in hand roasters or Bruckner cylinders, after which the charge is made up in large charge cars, elevated and dumped directly into the blast furnaces. The bullion product is nearly all refined at Trail by the Betts electrolytic method, which was described in the ENGINEERING AND MINING JOURNAL, October 11, 1902. The first plant of the kind (and the only one at the present time) was built during the past year, and has been operated continually since May last, with very great success. A new and larger refinery is now being designed, with an output of 30 to 40 tons of refined lead per day.

The works were practically closed down, with the exception of one lead furnace, during the greater part of 1902, on account of labor troubles in the Rossland mines; while lead ores were not mined, owing to the low price of lead and silver. Shipments from Rossland were resumed in September, and since that time the copper department has been running at about two-thirds capacity.

The ore tonnage for 1902 was as follows: 45,000 tons in the copper furnaces; 30,000 tons in the lead furnaces; a total of 75,000 tons of ore smelted. There was produced from the above ores 1,050 tons of copper matte containing: Gold, 18,219 oz.; silver, 94,300 oz., and copper, 1,102,837 lbs. The lead bullion produced was about 4,200 tons, containing: Gold, 12,431 oz.; silver, 1,123,779 oz., and lead, 8,314,313 lbs. There was 876 tons of refined lead produced at the Trail refinery, all of which was sold on the Canadian market.

A NEW RUSSIAN COAL PORT.—A recent British consular report states that the town of Novorossisk has the prospect of becoming in the immediate future an exporting center for Russian coal. The large dimensions which modern steamers have attained, together with their greater draft, the cheapness of coal and the keen competition in the trade, have compelled both coal merchants and shipowners to concern themselves and devise means whereby the present heavy expenditure necessitated by lighterage and other dues at the Straits of Enikale, which a voyage up the Sea of Azov entails, may be avoided, and it is reported that they have come to the decision to abandon the Azov route and load their steamers at Novorossisk.

PEAT AS FUEL FOR LOCOMOTIVES.—The directors of the Swedish State Railways have issued their report on the experiments with peat as a locomotive fuel. It was ascertained that with very good peat it is possible to haul the maximum train load. The calculations as to cost show that firing with peat is just as cheap as firing with English coal, if a price of 9.50 kr. for peat and 16 kr. for coal is taken as a basis without considering the cost of transportation. It has been decided that four of the freight trains in the Third District are to be fired with peat. In order to avoid the need of two firemen, it was decided that the peat is to be mixed with an equal weight of English coals. The firing with this mixture was begun on December 9, on two trains on the Alvesta-Malmo line.

NOTES ON ACCIDENTS DUE TO COMBUSTION WITHIN AIR COMPRESSORS.*

By ALBERT R. LEDOUX.

With the improvements in design and efficiency of machinery the element of danger in its use is becoming less, but it is a question whether the strain involved in operating modern plants is not increasing somewhat the danger of accident due to human fallibility.

I propose to describe a somewhat uncommon casualty resulting from a not infrequent incident in the use of air-compressors. It is not necessary to state the location of the mine in which the accident occurred nor the makers of the compressor, and the object of this brief paper is more to draw out suggestions from members more familiar than am I with the practical handling of mining machinery, than to point a moral.

The compressor in question was a three-drill machine of standard make. At the time of the accident it was furnishing air to a single drill working in an upraise from a well-ventilated tunnel, and giving ventilation to a winze below the tunnel where two men were hand-drilling. The compressor also furnished power to a small hoist in the winze, but the hoist was only operated occasionally, and never while the drills were working. The drills were located about 1,200 ft. from the compressor. The engineer testified that he never had been short of air, and that there had been no complaints that the machine was inefficient. The engineer testified further that the water used in cooling the air-cylinder had never become greatly heated, but that he used a mixture of good cylinder oil and of a lighter grade known as "Atlantic Red." The valve of the compressor was set to blow off at 80 lbs. He was eating his luncheon in the boiler room when he heard a "crack like a pistol," and going into the engine room found water spurting out of the jacket about 2 ft. from the end of the compressor; he tightened the jacket and stopped the leak, and found that the jacket was perfectly cool. He next noticed that "grease began to fry on the pipe and receiver."

He next saw that the air pipe had become red-hot, the heat extending to a point where the pipe went through a wooden partition, setting fire to it. Then he noticed that the pressure was going down "just as quick as if some one had opened a valve outside," which, in fact, is what happened. He stopped the engine, but, getting the signal for more air, started up again. It is well to note at this point that the intake of the compressor was in the engine room, the temperature of which usually stood at 115° F.

Let us now see what occurred in the mine. What happened at the bottom of the winze cannot be better told than in the testimony of one of the miners at the Coroner's inquest: "I was turning a hole and my partner was striking the drill. He says, 'We ain't got much air here this morning; I will ring for some more air.' He rang, started to strike again, and struck two or three blows; straightened up and took a couple of breaths of air, and started in to strike again, and then quit. I had been joshing him, and says, 'You ain't as tough as you used to be.' I stood up, picked up a pick, struck two or three blows, and felt that the air was bad. Just then the air stopped, and the hoist tender hollered to us that there was no air, and we had better come up. I looked around and seen my partner standing in the corner. He was all trembling, and I caught him as he fell over."

These two men were gotten up by heroic work on the part of comrades, and their lives were saved But not so fortunate were the men in the upraise. There were four of them there, and when they felt the air getting bad they opened the valve full, of course, only increasing the difficulty. They were experienced miners, and at first could not understand what was the matter with them, because their candles continued to burn as usual. This was due, undoubtedly, to the fact that they were working in an upraise, and that the heavy carbonic acid gas sank, and perhaps to the fact that carbonic oxide may have been generated through incomplete combustion or the reduction of the carbonic acid, first formed, by the glowing carbon in the pipe.

Two men were killed and four others barely escaped with their lives, as a result of the combustion of the oil, deposited carbon and organic dust accumulated in the compressor, receiver and pipe. Explosions of air compressors due to this cause have been frequent, and lives have been lost thereby; and what is known as the "flaming" of compressors or cylinders is an everyday experience, and in some cases the rupture of the air pipes, but so far as I can ascertain, without the serious consequences described in the present case.

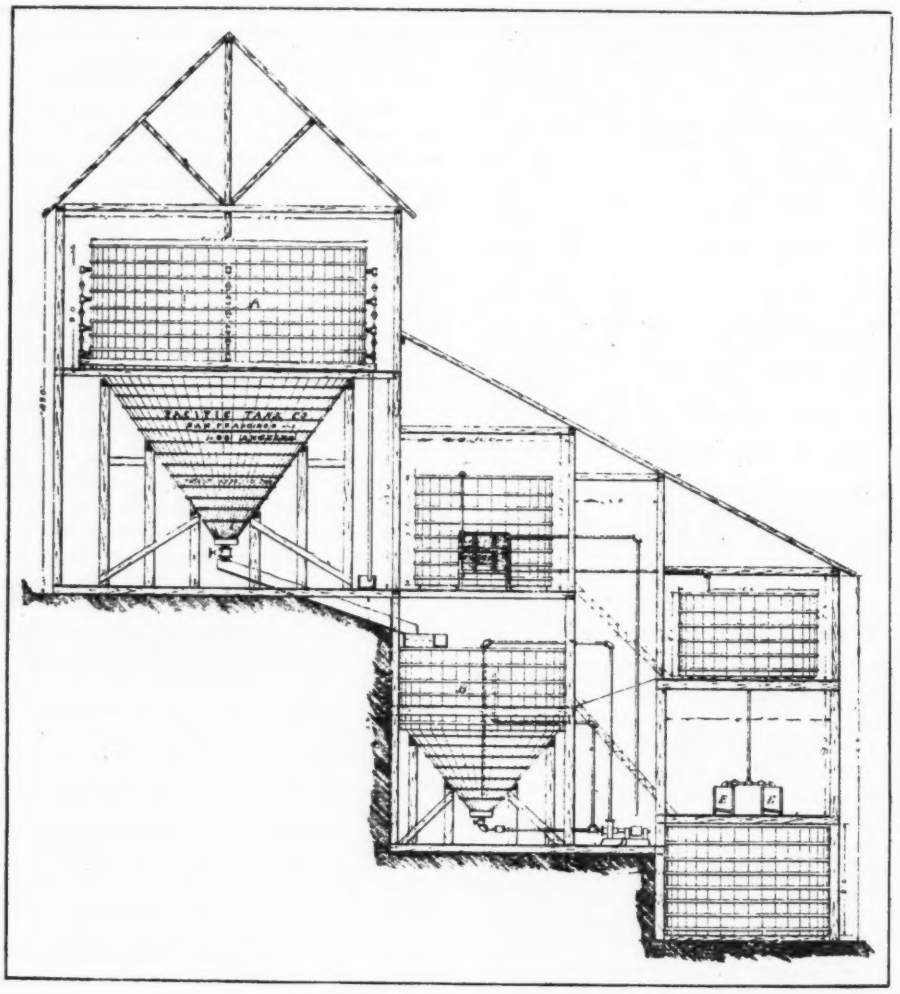
I shall leave to those better qualified than I the discussion of the best means of preventing such catastrophes. Among those which suggest themselves are the taking in of the air from a point where its temperature is as low as possible, the introduction of auxiliary coolers, the use of as heavy oil as possible—yet never in excess—the cleaning out of cylinders, receivers and pipes, and especially a warning to the engineer to be very sure, when he receives a signal for more air, that the actual shutting down of the compressor may not be more essential. In this case, had he shut down it is probable that no lives would have been lost, for with the stopping of the air the miners would have at once returned to the tunnel level.

* A paper read at the Albany meeting of the American Institute of Mining Engineers.

TREATMENT OF SLIME IN TANKS WITH CONICAL BOTTOMS.

At the Confidence Mine, in Tuolumne County, California, there is at present in operation a slime plant constructed with radical changes in regard to tanks, the details of which present interesting features. The Confidence Mine formerly operated a canvas plant, and the problem was how to save the value escaping in the tailings, which carried from 50 to 60 per cent slimes. Mr. Neil Carmichael is superintendent of the mine, and at his suggestion Mr. A. S. Additon undertook an investigation of the matter. As a result the plant herewith described was installed by Mr. Additon.

The tailings are conveyed to the cyanide works in a flume; here they pass through hydraulic classifiers, and are separated into two products—sands and slimes. After making a number of tests, it was decided that about 30 per cent of the slimes could be treated satisfactorily with the sands, and a separation was affected accordingly. The remaining slimes, representing about 25 to 30 per cent of the tailings, are treated apart, as described later on. The sands are conveyed from classifiers to leaching vats, 30 ft. in diameter by 5 ft. deep, two vats being loaded at the same time, each alternately receiving sands and drawing off battery water, and while one pair of vats are filling, the other four are undergoing treatment. By this arrangement the treatment is completed in six days.



PLANT FOR CYANIDING SLIMES.

The slimes are conveyed from the classifiers, by flume, to three settling tanks, 20 ft. in diameter, 9 ft. staves, and 14 ft. depth of bottom, the bottom sloping at an angle of 50°, each tank having a capacity sufficient to hold the separated slimes for an eight hours' run of the stamp mill. As soon as one settling tank is filled, the slimes are turned into the next one. Lime is then added by scattering it over the surface of the charge, the quantity of lime being determined by accurate acid tests, the amount re-

---

MANGANESE ORE FROM BRAZIL.—Exports in 1902 were 143,320 metric tons, of which a large part came to the United States. Compared with 1901 the shipments have increased over 40 per cent. The grade of this ore varies from 48 to 50 per cent manganese, but it is all sold on a basis of 50 per cent.

quired for neutralization being sufficient to settle the charge in seven hours. When completely settled, the water is decanted by means of four sets of 2-in. valves running spirally around the tank, each set lowering the water about 18 ins. In this way, the decantation is conducted with the least possible movement to the body of water. The remaining slimes carry about 40 per cent of moisture, and in this condition they are discharged through an 8-in. gate valve, placed at the lowest point of the settling tank, into a flume leading to the agitator tanks. The agitator tanks are 12 ft. in diameter, with 8-ft. stave, and 6-ft. depth of bottom, the bottoms sloping at 45°. Before the slimes are run into the agitator tanks, a certain amount of cyanide solution is run in and agitation started by means of two 3-in. centrifugal pumps attached to each agitation tank, the slimes being gradually fed. As soon as the filling is completed, the exact moisture is determined and, if necessary, the strength of solution corrected. Agitation continues for 12 hours.

The agitator pumps have their suction near the surface of the charge, and they discharge near the bottom of the tanks, which keeps the pulp in a uniform condition and prevents any possible settling. The pulp is agitated at from 66 to 68 per cent moisture, this moisture carrying 2.5 lbs. KCN per ton.

Agitation being completed, one pump is shut off, while the suction of the other is changed to bottom of charge. Then the pulp is fed by means of a steam pump into a filter press with 8-oz. duck filter cloth. The press has a capacity of 48 cakes, 30 ins. square by 2 ins. thick. It requires 25 to 30 minutes to fill the press, 30 minutes to wash the cakes and one hour to discharge. The steam pump is controlled by a steam regulating valve, and the number of strokes per minute is accurately regulated.

When the pump stops the press has been filled under an almost uniform pressure of 78 lbs. per square inch. The wash-water is applied from the regular pipe line of the mill, the pressure being sufficient, and washing continues until the solution shows but 0.5 lb. KCN per ton. At this stage, the press is ready to be discharged. This is accomplished by dropping the cakes into a tram car and conveying them to the dump. The solution recovered from slimes in press is pumped to the gold solution storage tank, and from there to standard zinc boxes, where precipitation takes place in connection with filiform zinc.

The extraction of values from the slimes is stated to be 98 per cent by this method, 94 per cent of the head value being recovered. In the treatment of the sand by percolation 85 per cent is said to be saved, making the total saving a very satisfactory treatment of a difficult product. The actual cost per ton for treatment is said not to exceed 95 to 90 cents.

The wooden tanks used in this plant were furnished by the Pacific Tank Company, of San Francisco, who are the sole manufacturers of conical bottom redwood tanks, having patented this feature. The tanks are considered an unqualified success.

Previous to the erection of this plant the Confidence Mine made a good saving from the tailings with a canvas plant, and impounded the tailings after passing over the canvas plant. These accumulated tailings still retaining some values, a tailings' plant of 100 tons daily capacity was designed and put in operation by Mr. A. S. Additon, who leached about 10,000 tons last season with very satisfactory results, but owing to a very large percentage of slimes in these tailings, it is impossible to treat them during the winter months; but their treatment will be continued next summer, and it will require several seasons to clean up this dump. Meanwhile the canvas plant has been discontinued, and the present plant is taking everything direct from the mill. The successful treatment of slimes is always a serious problem, and it is pleasing to note the success of this plant in California.

In the accompanying drawing of the mill, A represents settling tanks, B agitator vats, C filter press, D agitator pumps, and E the zinc boxes.

PROTECTION TO SHAREHOLDERS IN ENGLISH MINING COMPANIES.

BY OUR LONDON CORRESPONDENT.

In spite of the many loopholes for fraud discovered by unscrupulous promoters and dishonest attorneys, the English company laws on the whole afford considerable protection to shareholders. The question is often asked: In what way are the interests of original vendors of mining properties and those of shareholders in English mining companies safeguarded against high-handed treatment on the part of directors? The subject is, of course, an intricate one, and to a layman the laws or Companies Acts appear complicated, but a few of the main features of the operation of these regulations may be outlined at this time.

In the first place, it should be said that every limited company registered in England has to file at Somerset House, on registration, a copy of (1) its memorandum of association, that is, a statement of the objects of the company, and (2) its articles of association, that is, its detailed rules of administrative procedure and routine. The articles deal with the duties of directors, the calling of meetings of shareholders, etc. They are drawn up by each company to suit its own convenience, but are usually modeled after a specimen given in one of the Acts. It is also necessary to file, at Somerset House, all contracts on which shares are issued, and all deeds mortgaging any of the company's property, and once a year a list of directors and of shareholders must be filed, with their address and their holdings. These files are open for inspection by the public, and copies can be purchased for a nominal sum, so it is obvious that any one can find out exactly what are the powers of the directors, etc. The officers of the company are also bound on demand to show their register of shareholders, containing the names, addresses, and holdings, and to supply vouched copies of the same. It is therefore possible for aggrieved shareholders to put themselves into communication with their fellows, so as to enable them to take concerted action against the board. By law it is not absolutely necessary that accounts should be kept, or balance sheets or reports issued, but the standard articles of association provide that proper balance sheets shall be issued every year. As a matter of custom all public companies circulate balance sheets and reports every six or twelve months, to their shareholders and to those of the public who ask for them. It is provided by law that the directors shall call a meeting of shareholders at least once in the year. It is allowed also that by the request of one-fifth of the number of shareholders, the directors shall be obliged to call a meeting to discuss any matter in connection with the administration of the company. Moreover, a director may be removed from office at any time by a vote of three-fourths of the total shareholders.

An original vendor may sometimes get into trouble by consenting to part with his property for shares in a company, which subsequently runs short of funds. The directors may then decide to wind up the company and sell the property for what it will bring, or to reconstruct with a liability on the shares. A company, however, cannot be wound up or reconstructed except with the consent of three-quarters of the shareholders, so that with a little ingenuity the vendor may guard against this eventuality. The reconstruction of a company with a liability on the shares often presses heavily on the shareholder who has subscribed money originally, but he also is protected from arbitrary action by the directors, by the fact that such a scheme has to be sanctioned by three-fourths of the shareholders.

In calculating votes of shareholders either for an ordinary majority or a three-fourths majority it should be mentioned that a motion is first put to the meeting and decided by a show of hands. If either party demands a poll, the whole of the shareholders, whether present or not, can vote and then each share counts as one vote.

A method of outwitting shareholders, sometimes practiced by directors, is to ask shareholders for proxies, to be used at a certain meeting, before the precise nature of the proposition to be put forward has been divulged. Shareholders may thus be induced to vote for resolutions which they would not have supported, if they had attended the meeting and taken part in the discussion.

It will be seen from the above remarks that shareholders have many ways of keeping directors within control and of safeguarding their own interests. As a matter of fact, however, there is a great difficulty in getting shareholders to act with cohesion and unity, when opposing the policy of the directorate. The directors are necessarily more intimately acquainted with the details of the business, and they have the official assistance of counsel in interpreting the law and the articles of association. An objecting shareholder or a body of them is therefore easily repulsed. On the other hand, the publicity surrounding the doings of directors, the reports of proceedings in the press, and the openly expressed opinion of men of position, all have a healthy influence in keeping the truculence of an objectionable director within reasonable bounds. It has, of late, been proposed to establish some central institution to undertake the organization of shareholders in actions against directors, but hitherto all such attempts have degenerated rapidly into scorpions, instead of whips, for the shareholders' backs, and organizations with this ostensible object nowadays are merely blackmailing devices or dodges for raising a bit of business for third-rate attorneys.

The company laws place great responsibilities on the shoulders of directors, so that it often happens that the real controller or manager of a business prefers to keep himself in the background, and to nominate others to act for him. These sometimes do not understand, or do not object to, the serious responsibilities they assume; for instance, each individual director is made personally responsible for the correctness of all statements made in a prospectus.

There are three main types of directors. First, there is the thoroughly honorable gentleman, who does not understand the intricacies of the company law and consequently often finds himself landed in an unpleasant position. An example of this class is the late Marquis of Dufferin. Secondly, there is the adventurer who does not worry over the responsibilities of his position, but takes great risks of failure and prosecution. Mr. Whitaker Wright is a type of that class. Thirdly, there is the trained man of business who understands the responsibilities and takes all necessary precautions to guard his own interests and those of the shareholders he represents. Fortunately, there are many such men in the city of London, who are connected with mining administration. Men of this last type make it a rule to submit all important propositions to meetings of shareholders for their confirmation. They rightly consider it prudent that though the directors may be perfectly entitled to initiate and carry through various schemes it is best to take shareholders into their confidence and so spread responsibilities. For instance, schemes for new plant, entailing a large expenditure, to be met either from capital or revenue, the closing down of a mine, the acquirement of another property, and so on; in the best mining companies such business is submitted to shareholders for their confirmation. From the above remarks it will be seen that the duties of directors are clearly defined both by law and custom, and that the conscientious director finds his position anything but a sinecure.

IRON AND STEEL EXPORTS OF GREAT BRITAIN.—Exports of iron and steel, and manufactures thereof, from Great Britain for the two months ending February 28, are valued by the Board of Trade returns as follows:

	1902.	1903.	Changes.	
Iron and steel	£3,802,750	£4,723,931	I.	£921,181
Machinery	2,633,941	2,855,955	I.	222,014
New ships	1,126,978	482,694	D.	644,284
Totals	£7,563,669	£8,062,580	I.	£498,911

The figures indicate a large increase in trade this year, except in the shipbuilding business, which continues in a depressed condition.

ARTIFICIAL GRAPHITE IN 1902

By F. A. J. FITZGERALD.

The manufacture of graphite electrodes was not so large in 1902 as in the previous year, due to the fact that there were fewer new works equipped. Nevertheless, the number of works using the new electrode increased, for certain valuable properties of these electrodes not previously fully appreciated, have been recognized. These properties are: the resistance of the graphite electrode to oxidization when heated in the air, its high electrical conductivity, and the ease with which it can be machined. These properties being recognized, the value of the graphite electrode in electro-metallurgical work is obvious. In a paper read by C. L. Collins at the first meeting of the American Electrochemical Society these properties are fully discussed.[1] The electrical resistivity of graphite has been shown to be one-fourth that of amorphous carbon electrodes, and it therefore follows that for any given current, graphite need only have one-fourth the sectional area of amorphous carbon electrodes. In most electro-metallurgical work the wearing away of the electrodes is inevitable, whether they be made amorphous carbon or graphite; but there is considerable loss in the use of amorphous carbon as only part of the electrode can be used, the end which is connected to the cables conveying the current, being wasted. This waste is done away with when graphite is used, for threads can be cut on the ends and the electrodes can be drilled out and tapped, thus permitting them to be screwed together and fed continuously into the furnace, so that no loss results. The heat conductivity of graphite as compared with amorphous carbon is increased in about the same proportion as the electrical conductivity, and it is thought that this may lead to some new uses for the former substance.

A new patent[2] has been obtained on a method of graphitizing electrodes. The electrodes are placed in piles in an electric furnace, the piles being separated from one another by spaces filled with a "material having a lower coefficient of electrical conductivity" than the electrodes. The current is then passed through the mass with the result that most of the heat energy is developed in the material in the spaces between the electrodes. The advantage of this method is that large furnaces can be employed and yet, the electrical resistance kept sufficient high to avoid the use of currents of very high amperage.

The manufacture of paint from artificial graphite has increased considerably, for it is now recognized that being a manufactured material a greater purity and uniformity can be obtained than is possible with a natural product. But the most marked increase has been found in its use in dry batteries. Hitherto amorphous carbons of various kinds, especially retort carbon, have been used for this purpose. Pure graphite has many advantages, such as high electrical conductivity, great resistance to chemical action, and absence of the property of occluding gases which is possessed more or less by all forms of amorphous carbon. Natural graphites of the necessary purity for work of this kind are so expensive that the price is prohibitive in most cases. While artificial graphite has been used for some time as a lubricant, it is only within the last year that the problem of producing a lubricant for high-grade work has been successfully solved. Experiments have also been made with artificial graphite for coating the grains of high explosives. The spontaneous ignition of high explosives is supposed to be caused sometimes by a static charge of electricity on the grains, this causing a spark which detonates the powder. By coating the grains with graphite the formation of the static charge is prevented. Very great purity is required in the graphite for this work, and hence natural graphites are prepared by treating according to Brodie's process, that is, heating with a mixture of potassium chlorate and sulphuric acid, thoroughly washing with water and then heating to redness. No matter how carefully this may be done it is almost impossible to avoid the presence of sulphur compounds in the graphite, derived from the sulphuric acid, a great objection since the formation of sulphuric acid even in minute quantities has a deleterious effect on the powder. Artificial graphite is purified by heating to a very high temperature in the electric furnace, so that all impurities are vaporized, a more satisfactory method than the chemical treatment used with the natural product.

A new patent on a process of making graphite[3] has been obtained. This depends on causing metallic vapors to act upon amorphous carbon at the high temperature of the electric furnace. The amorphous carbon, such as the substance obtained from the distillation of petroleum oil, known as "petroleum coke," is placed in a furnace and mixed with a metallic compound, such as ferric oxide, and extending from one end of the furnace to the other is a core composed of carbon rods or plates which acts as a conductor for the current. On passing the current through the furnace the petroleum coke is heated to a high temperature, the oxide of iron is reduced and the vapor of metallic iron acts on the amorphous carbon, converting it into graphite.

[1] *Transactions of the American Electrochemical Society.* Vol. I, No. 1.

[2] United States Patent 702,758, June 17, 1902.

[3] United States Patent No. 711,031, October 14, 1902.

MICA —ITS USES AND VALUE.

By CHARLES C. SCHNATTERBECK.

With the development of the electrical industry—the most important consumer—the value of mica has increased, stimulating the energetic exploitation of these mineral deposits throughout the world. At times prospectors are so enthusiastic over their finds that a kind of "mica mania" becomes prevalent everywhere. Unfortunately, however, many discoveries are practically worthless because the mica is obtained only in diminutive pieces, or it is smoky and of uneven cleavage. At other times, when a good deposit is unearthed, it is found to be too far from such transportation facilities as ensure economical working. Consequently, most of the mica consumed at present is being recovered from the older deposits in the United States, Canada and India.

Commercial mica occurs in three varieties—muscovite, the commonest variety, called "white mica," is found in granites and gneisses, in crystals, detached masses and in veins; phlogopite, "amber mica," nearly free from iron, occurs mostly in crystalline limestone; biotite, "black mica," highly colored with oxide of iron, is not so abundant and is of least importance commercially. Other varieties, with the exception of lepidolite, are only of mineralogical interest. Lepidolite, or lithium mica, which is mined in the United States in California and in the Black Hills, South Dakota, is employed in the manufacture of lithia tablets for medicinal purposes.

The largest consumer of mica is the United States, which takes a good part of the world's supply, although its own production is rapidly increasing. The important mines of the United States are situated in Mitchell and Yancey counties, North Carolina; in Grafton County, New Hampshire, and in the Black Hills, South Dakota. Good deposits also exist in Virginia, New Mexico, Idaho, Maine, Connecticut, Wyoming and Nevada.

In Canada extensive mines of phlogopite or "amber mica" are being operated in Ottawa County, Province of Quebec. Other deposits are situated in Perth and Renfrew counties, Ontario, and good discoveries are reported from British Columbia, near Kamloops.

The mica from India is known all over the world, and for many years this was the most important source of supply. The mines are in the Bombay Presidency, and in the Nellore District of Madras. This mica is marketed in four varieties, called "clear ruby," which is hard and tough; "ruby stained," discolored and smoked; "soft white," a transparent white, and "splittings," black and flawed. These varieties are numbered in grades from 1 to 5, are sold in all sizes and are packed in boxes of 112 pounds each. They are shipped from Calcutta to London, England, for distribution to the consumers.

Numerous other countries have large deposits of mica, but few of them have as yet produced any commercial quantity, owing to the lack of railroad facilities.

The method of mining and preparing mica for market is simple, as the waste is large, being from 4 to 8 or even 10 per cent of the bulk used in making marketable sheets. The equipment consists of hand machines for drilling blast holes, a chisel and hammer for lighter work, and a knife and shears for dressing the "books" of mica taken from the mine. In recent years, it is gratifying to note, many uses have been found for this waste material, and when of good quality satisfactory prices are obtained.

Sheet mica varies widely as regards quality; the most valuable being uniform in shape and nearly transparent white in color, free from spots or other stains and flaws. For some purposes flexibility, softness and toughness are also considered by consumers. The commercial or standard sizes of sheets vary from 1½ ins. by 2 ins. up to 8 ins. by 10 ins., for which the listed prices are 60 cents to $13.50 per pound, less the customary discounts. The trimmed blocks or "books" of mica from which sheets are cut are marketed in assorted sizes, from 1 to 3 ins. wide by 2½ to 4 ins. long up to 4 to 8 ins. wide by 8 to 10 ins. long, at 18c. to $2.50 per pound, without discount. These "books" are usually shipped in barrels containing from 300 to 400 lbs. Waste from trimming the sheets sells at a good price, according to its size and quality, and in the United States brings from $12 to $15 per short ton at mine. This waste is employed in the manufacture of patented specialties, which bring high prices. Waste for grinding is preferred free from rust or specks. Ground mica varies in size from 24 to 200 mesh and finer, and sells at $17.50 to $45 per short ton, f. o. b. New York, according to size and quality.

Sheet mica, transparent and without blemish, is used extensively as a substitute for glass in stove and furnace doors, lamp protectors, skylights, spectacles for quarrymen, compass covers, etc.

"Electric mica," that is, mica for insulating dynamos and other electrical purposes, need not necessarily be clear, but it must be without wrinkles, of perfect cleavage and permit gauging to as much as one-thousandth of an inch in thickness, it must be flexible, and capable of withstanding a high temperature without crumbling. Owing to the great number of patterns required, prices for "electric mica" vary widely, usually from 7½ cents to $2.50 per lb.

Waste mica, suitable for compressing and building into large sheets, is being employed in the manufacture of "micanite," a patented product for making lamp shades, tubes for covering armature wires, etc.

Finely subdivided scrap is also quilted between galvanized iron netting, or other material, and is used as a covering for boilers, etc. Patented packings are marketed as mica-cotton, mica-asbestos, mica-flax, mica-India rubber, are durable, light, do not harden in the glands, and do not score the rods. Being fireproof they stand heat well.

Ground mica has many uses. Coarsely ground it is employed for frosting and giving a spangling effect to wall paper, and fine, for making a metallic white surface. Other uses are as a grease for lubricating the journals and axle bearings of machinery; belting syrup and joint facing composition; pigments; roofing material, and as an absorbent of nitroglycerine. A patented process also utilizes finely ground mica mixed with water and plaster of Paris to make molds for sharp metal castings.

COAL IN JAPAN.—A recent report of the Imperial Geological Survey says that the oldest coal in Japan is found in the Mesozoic formation. The anthracites of Mine-gori in Nagato and Kawakamigori in Bitchu, occur in the upper Triassic and the Jurassic systems; those of Tanimura in Echizen, Shitka in Tango, and Tsukiki in Tamba in the Ju-

rassic system; and those of Amakusa in Higo and Miyai in Kii are in the Cretaceous system. In the Cretaceous system of Ryoseki in Tosa and of the Katsuragawa basin in Awa are intercalated a few coal seams of an inferior quality. Coal seams of far greater importance are found in the Tertiary system. Of the Tertiary coal-fields those of Kyushu and Hokkaido are the most extensive and valuable. In Honshu there are no remarkable coal-fields except one extending over Iwaki and Hitachi, which yields coal inferior to that of Kyushu and Hokkaido in quality as well as in quantity. The principal coal-fields in Kyushu are those of Miike and Chikuho, and the coal-fields of the province of Ishikari are the most important in Hokkaido. The total production of coal in Japan during 1899 amounted to 6,721,798 tons, 70 per cent of which was the output of the coal-fields of the three districts just named.

CANADIAN GRAPHITE.

By H. P. H. BRUMELL.

Notwithstanding the present activity of mining in the provinces of Ontario and Quebec, but little seems to be known of the extent and richness of the ores of graphite, the value of the industry or the variety of uses to which the mineral is put. Without going into details it may be stated that by far the most important use of graphite is in the steel, copper and copper-alloy industries as a refractory material in making crucibles, retorts, muffles, boxes, stirrers, etc. Other important uses are for lubrication, foundry facings, stove-polish, paints, electrotyping and pencils.

The two well defined trade divisions of this mineral are "amorphous" graphite and "crystalline" graphite. The former is usually of lower grade and more suitable for facings, paint, pipe-joint grease and stove polish, although the better qualities, particularly from Bavaria and Mexico, are used also in the manufacture of pencils and electrotyping, while for crucible making, lubrication, high-grade stove-polish and electrotyping, the purer or crystalline variety is generally necessary. The principal source of supply of crystalline graphite is the Island of Ceylon, from whence the ore is shipped in its crude form, after being sorted and sized, the grades being "lump," "chip," "dust" and "sweepings." The first two sizes form the bulk of the output used by crucible makers, while the "dust" and the "sweepings" are utilized for lubrication stock.

Amorphous graphite is found principally in Nova Scotia and New Brunswick, where it occurs as graphitic shale and clay. The most important deposits are those in the vicinity of St. John, N. B., others of lesser note occurring in Kings and Westmoreland counties, N. B., and at Lochaber, N. S. In Ontario several deposits of amorphous graphite have been found in Haliburton and Hastings counties, while in Brougham township, Renfrew County, a very extensive deposit occurs, having associated with it a considerable proportion of flake or crystalline graphite. This property is being operated by the Ontario Graphite Company, which has lately installed an extensive plant, and is now refining and shipping the product.

The largest known deposits of crystalline graphite are in the counties of Ottawa and Argenteuil, Quebec. Smaller deposits occur in Lanark, Leeds and Frontenac counties, Ontario. Of this quality there are two distinct classes of ore, "lump" and "disseminated," the former usually occurring in limestone, as nodules, or filling pockets and small veins. There are also many minor occurrences where the lump ore constitutes small veins in diorite or other igneous rocks. As yet no discovery of lump has warranted systematic mining. Disseminated graphite ore is practically a Sillimanite or other gneiss carrying graphite in a flaky or crystalline form, and varying in graphite content from a trace to 35 per cent. These bands of gneiss are found in the township of Buckingham and Lochaber, Ottawa County, many beds having a thickness of over 20 ft., and assaying on an average about 20 per cent of graphite. A number of beds have been opened and ore extracted and treated at the different mills in the district, more especially in later years at those of the North American Graphite Company, the Buckingham Company, and the Walker Mining Company.

As in many other industries the process of manufacture adopted by the different producers has been jealously guarded, the different "secrets" being considered the individual property of the refiner. Irrespective of secret methods, the practice adopted may be divided into wet and dry processes. No mill confining its operations to the dry or air method has as yet been commercially successful, because the similar gravity of the component minerals prevents a satisfactory separation. Several pneumatic separators lately put on the market have been partially successful, although they have not been able to eliminate the mica.

The wet or water separation method has been successful to a marked degree and high-grade graphite is being produced in this manner by the North American Graphite Company, of Buckingham, which is, at present, the only company in operation in the province of Quebec. It is expected that the plant of the Walker Mining Company will soon be at work. In the process of concentration used by these companies the ore is crushed and stamped wet, and a coarse separation made by stationary buddles. The concentrates are then dried, ground by buhr-stones and screened. An improvement, resulting in a saving in cost of about 25 per cent, has lately been made by the use of the Brumell separator, which treats the ore after drying by flotation upon, rather than immersion beneath, the surface of the water. By the wet method a higher degree of concentration is obtained than by the dry process, and the ground and finished concentrates retain their size of particle to a marked degree. As a consequence, those companies which employ wet methods are enabled to put upon the market the largest sized and purest flake crucible and lubricating stock.

Analyses of picked samples of graphite made by the Geological Survey of Canada have shown the following results:

Locality.	Carbon per cent.
Buckingham Township, Quebec (foliated)	99.675
Buckingham Township, Quebec (columnar)	97.626
Grenville Township, Quebec (foliated)	99.815
Grenville Township, Quebec (columnar)	99.757
Ticonderoga, N. Y. (foliated)	99.656
Ticonderoga, N. Y. (columnar)	97.422
Ceylon (foliated)	99.679
Ceylon (columnar)	99.792

It is a generally accepted fact that the world's supply of crystalline graphite needs to be increased because of the growth of the iron and steel industry, the largely extended use of copper and its alloys, the wider application of electricity and the increased needs for graphite lubrication. Flake graphite is known to exist only in crystalline rocks which, in the Laurentian series, has the greatest development in Canada, a feature which presents a promising future for the graphite industry of the Dominion.

MINING ENTERPRISES AND COMPANIES IN BOLIVIA.

United States Minister Sorsby transmits from La Paz translation of a recent decree of the Bolivian Government relating to limited companies and mining enterprises doing business in Bolivia, which reads:

Art. 1. Limited companies and mining enterprises, be their owners private persons or associations of other denomination or class, are obliged to keep books, as indicated in article 32 of the mercantile code, and also a register of the fineness of the metals they export.

Art. 2. The associations and enterprises designated in the foregoing article shall draw up their respective balance sheets and shall send two copies to the Minister of Finance and Industry or to the office of fiscal inspection within the 40 days following the termination of the year, without omitting the publication and remittance to be effected by said associations in accordance with the supreme decree of March 25, 1887.

Art. 3. Within the same period of 40 days the payment of the fiscal tax of 2 per cent of the net profits must be made in the respective departmental treasury, in favor of the National Treasury.

Art. 4. For the purposes of the foregoing article, net profits shall be understood to be the sum set apart for the payment of dividends—or rather the gains of the partners or owners, whether they reside within the Republic or abroad.

Art. 5. The dispositions contained in articles 3 and 4 of the decree of March 25, 1887, are applicable to mining enterprises, whether they be owned by private persons or associations.

Art. 6. The administrators of departmental treasuries are obliged, on their own responsibility, to give notice to the Ministry of Finance of such associations or enterprises as have not paid the fiscal tax within the period stated in article 3 of this decree.

Art. 7. A term of 60 days from the date of the publication of this decree is allowed for the mining enterprise and limited companies to be inscribed in the registers opened in the prefectures of the departments, in accordance with the afore-mentioned article 3 of the decree of March 25, 1887.

Art. 8. Any failure to comply with the dispositions contained in articles 1 and 2 of this decree will be punished with a fine of 500 to 1,000 bolivars ($180.50 to $361) imposed by the prefect of the respective departments, or the inspector named by the Government, on the guilty enterprises or associations; and, furthermore, their profits shall be calculated by special commissioners at the expense of the association or enterprise.

Art. 9. The same fine will be imposed on all enterprises or associations that fail to comply with the provisions of article 7.

The articles 3, 4 and 9 of the decree of March 25, 1887, above referred to, are as follows:

Art. 3. The registers that the prefects must cause to be formed in each capital of department, up to July 31 next, shall contain the title of the company, its object, its nominal and effective capital, and the name of the manager or administrator responsible for the payment of the tax. A copy of these data shall be sent to the administrator of the respective departmental treasury and to the Minister of Industry.

Art. 4. In the same register shall be inscribed the companies organized thereafter.

Art. 9. The general balances and the lists of shareholders shall be published annually in the report of the directors or of the representative within 90 days from the termination of the year.

RAILROADS IN PORTUGUESE AFRICA.—It is reported from Lisbon that a contract has been approved between the Portuguese Government and Robert Williams, an Englishman, for a railroad 870 miles long, which is to start from the Bay of Lobitio, on the Atlantic coast, and run through the province of Angola. A guarantee of £84,000 has been deposited. The Portuguese Government grants the contractor the right for ten years to all minerals within an area of 75 miles on each side of the line. There is no absolute concession of land nor any immunity from taxes in the terms of the decree.

MINING MACHINERY EXPORTS OF GREAT BRITAIN.—Exports of mining machinery from Great Britain for the two months ending February 28 are valued by the Board of Trade returns as follows:

	1902	1903	Changes.
Europe	£7,413	£6,416	D. £997
South America	5,170	2,398	D. 2,772
South Africa	33,594	42,145	I. 8,551
East Indies	7,066	15,791	I. 8,725
Australia	19,374	12,184	D. 7,190
Other countries	8,301	27,331	I. 19,030
Totals	£80,918	£106,265	I. £25,347

The notable increases were to South Africa and the East Indies. Exports to Australia showed a considerable decrease.

MINERAL IMPORTS AND EXPORTS OF SPAIN.—Imports of fuel into Spain in January were 157,288 tons of coal and 15,363 tons of coke. Exports of minerals for the month are reported by the *Revista Minera* as follows, in metric tons:

	1902.	1903.	Changes.
Iron ore	544,672	662,864	I. 118,192
Copper ore	64,264	65,623	I. 1,359
Zinc ore	1,850	13,233	I. 11,383
Lead ore	226	274	I. 48
Pyrites	58,983	63,405	I. 4,422
Salt	11,651	20,562	I. 8,911

Exports of metals included 1,956 tons of pig iron, against 2,236 tons in 1902; 2,561 tons copper, against 1,937 tons; 299 tons zinc, against 296 tons; 9,971 tons lead, against 13,271 tons. The decrease in lead is remarkable.

NOVA SCOTIA MINES IN 1902.

The report of Dr. Edwin Gilpin, Jr., Inspector of Mines of Nova Scotia, for the year ending September 30, 1902, gives the following statement of production for the year:

		1901.	1902.	Changes.
Gold	oz.	30,537	28,279	D. 2,258
Iron Ore mined	tons	419,567	15,214	.....
Iron Ore imported	tons		474,517	.....
Manganese Ores	tons	10	150	I. 140
Coal raised	tons	3,625,365	4,362,869	I. 737,504
Coke made	tons	120,000	406,152	I. 286,152
Gypsum	tons	135,637	173,000	I. 37,363
Grindstones, etc.	tons	315	4,000	I. 3,685
Limestone	tons	95,794	223,606	I. 127,182
Barytes	tons	600	742	I. 142
Pig Iron	tons	90,034	206,193	I. 116,159
Moulding Sand	tons	.....	1,390	I. 1,390

The figure above gives the returns of coal mined. The coal sold in 1902 was 3,898,626 tons, which was distributed as follows: Nova Scotia, 1,382,563; New Brunswick, 319,338; Prince Edward Island, 56,203; Newfoundland, 105,287; Quebec, 1,243,980; West Indies, 5,982; United States, 751,382; other countries, 33,891.

The sales of coal in Nova Scotia increased 383,749 tons, due principally to the requirements of the Dominion Iron and Steel Company, which drew its supply for coke and other purposes from the Dominion Coal Company. The sales to New Brunswick showed a slight decrease. The exports to Newfoundland and Prince Edward Island remained stationary. The sales to Quebec increased by nearly a quarter of a million tons. The sales to the United States showed an increase of about 200,000 tons.

Progress has been made in the development of the coal resources of Inverness County. At Broad Cove development has reached a state permitting of regular shipments over the Inverness Railway and Coal Company's road to a very fine pocket pier at Port Hastings.

At Mabou, the Mabou Coal Company has continued the slope sinkings, and so far as they have extended the value of the property has been largely increased. This company is completing a railroad about six miles long, from the mine to a shipping place in Mabou Harbor, and will, it is expected, continue the road to a junction with the Intercolonial Railway at Orangedale.

At Port Hood, the colliery of the Port Hood Coal Company is working regularly, and has made considerable shipments.

In Cape Breton County, on one of the Murray leases, the discovery is reported near the Cochran Lake seam of a new seam, 4 ft. 6 ins. thick. This should underlie many square miles of territory.

The development of the submarine areas of the Gowrie & Block House Company has been steadily continued. Boring and searching for coal has been carried on at a number of points, but it is understood that nothing new can be reported.

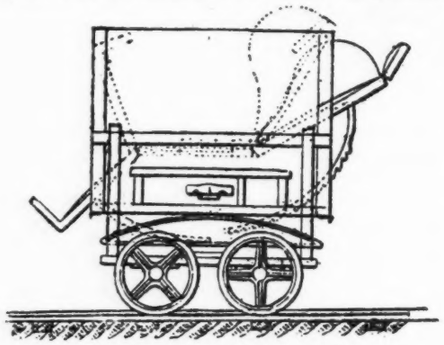
In copper, the principal fact noted is that the Cape d'Or Company continued development work and expressed confidence in the presence of large bodies of rock carrying a workable percentage of copper. The company has made several openings and is building a railroad to convey the ore from its mines.

The gold mines continued to be worked with very little change shown during the year.

THE ASHIO MINE, JAPAN.—The Ashio copper mine, the largest in Japan, is in a mountainous region in the province of Shimotsuke. It is about seven miles from the railroad. The mine was discovered in 1610, and early in the seventeenth century, a large quantity of copper taken from it was used in several noted buildings still standing. A small quantity was also exported to Holland. The mine was owned by the Government up to 1871, when it was sold to a private company. Owing to mismanagement by this company, production ran down to a very low point, but in 1877 it was bought by the present owner, Ichibei Furukawa, who still operates it, and has introduced many improvements in mining and metallurgy. There are seven principal veins now worked. The vein-stone is quartz and calcite, and the ore is chalcopyrite with iron pyrite and some galena, zinc-blende and arsenopyrite. The quality of the ore is better in the upper part of the veins, where it has been altered to bornite by weathering. The prosperity of the mine is due to the regularity and great thickness of the lode and the good quality of the ore. The yield of copper from this mine in 1900 was 5,729 metric tons.

A MINE AMBULANCE.

The accompanying illustration shows an ambulance car for carrying injured miners, which has been in use for some time at the mines owned by Count Wilczek in Austrian Poland. For the illustration and description we are indebted to *L'Echo des Mines.* The contrivance, as will be seen, is very simple. The car is made to run upon the ordinary mine tracks, and is provided with a foot-rest and head-rest which can be adjusted. The injured person can be placed on the seat in the car with the feet in front and the head at the back. The foot-rest and head-rest can be lowered or raised at will, so that the position



AMBULANCE CAR FOR MINES.

of the injured man can be varied from a horizontal to an ordinary sitting position. The seat is hung on springs. A drawer placed in the lower part of the car, contains bandages and other simple surgical appliances which are likely to be needed in case of accident. In the Wilczek mines each shaft is provided with a car, while in the larger openings several are always ready for use. The device is a simple one, and is likely to be of great service, in case of accident.

IRON CONSUMPTION IN GERMANY.—The consumption of pig iron in Germany is estimated by *Stahl und Eisen,* as follows, in metric tons:

Production for the year	8,402,660
Imports	174,990
Total supply	8,577,650
Exports	516,165
Consumption	8,061,485

The imports and exports include scrap iron fit only for re-melting. The balance, or estimated consumption, compares with 7,775,906 tons in 1901, and 9,059,431 tons in 1900.

MINING UNDER THE SEA.—The London *Iron and Coal Trades Review* says: "A rather novel method of sinking a shaft is reported from Bo'ness. The shaft, it appears, is being sunk on the foreshore at Carriden. A trestle bridge or gangway is laid out to near low-water mark, a distance of some 250 yards. The shaft, as it stands surrounded by water, has been successfully sunk through the soft ground with the assistance of a wooden box measuring 20 ft. by 9 ft. This box, secured at the corners by angle irons, was weighted to the extent of 90 tons. On reaching a depth of 25 ft., the material gathered inside was taken out, and supporting beams put in every 4 ft. until the bottom of the cylinder was reached. When this was done, it was found that the cylinder rested on two large boulders, and on good firm clay. For the next 30 ft. clay was excavated in the usual method of sinking till the rock-head was reached. For the next 18 ft. this rock was cut out, when a bed was dressed, on which a concrete wall was laid. This wall is brought to the surface 2 ft. thick all round the sides. The shaft has at present attained a depth of some 150 ft. without mishap, notwithstanding the tedious and difficult nature of the work. The total depth of the shaft will be 60 fathoms, and it is expected that three workable seams of coal will be cut. The coal-field, which is said to extend many acres seawards, is a continuation of the well-known seams of the Bridgeness Coal Company. The new venture is in the hands of Mr. R. T. Walker, mining engineer."

ABSTRACTS OF OFFICIAL REPORTS.

Isle Royale Copper Company, Michigan.

The report of this company covers the year 1902, and for the first time gives detailed information regarding the operations of the mine during the year. The financial statement shows that the receipts for copper—sold at an average price of 11.91c. per lb.—were $425,125; for silver sold—18,523 oz. at 47.95c.—$8,882; for interest and other income, $66,768; making a total income for the year of $500,775. Crediting the total receipts to the copper, the earnings and expenses, with the averages per pound of copper, are shown in the following table:

	Total.	Per lb. copper.
Gross receipts, as above	$500,775	14.03
Running expenses at mine	$400,539	1123
Smelting, transportation, etc.	60,447	1.69
Construction	10,291	0.29
Exploration	8,658	0.24
Total expenses	$479,935	13.45
Net balance	$20,840	0.58

The balance brought forward from 1901 was $406,415, making a total surplus of $427,255 at the close of the year. Of this surplus the sum of $257,327 was in cash and accounts receivable; $32,000 in Lake Superior Smelting Company stock; the balance in copper on hand and supplies at mine.

The mine report shows that during the year 298,594 tons of rock were hoisted, and 263,672 tons stamped. From this there was obtained 5,219,305 lbs. mineral, yielding 68.4 per cent, or 3,569,748 lbs., of fine copper. This shows 0.6 per cent copper in the rock hoisted and 0.675 per cent in the rock stamped. The total expense per ton stamped was $1.59, which was made up as follows: Mining, 98.845c.; rock-house, 9.133; transportation, 5.067; stamping, 26.433; surface expenses, 2.354; office expenses, 3.190; incidental expenses, 6.978; construction, 0.039; exploration, 0.032c. The average number of men employed for the year was 414. Opening work included sinking No. 1 shaft 61.5 ft. below the sixteenth level and No. 2 shaft 69 ft. below the same level. Drifting on the Isle Royale lode amounted to 2,665 ft., and on the Portage lode, 1,831 ft., a total of 4,516 ft. of drifting. Some good stoping ground was opened up on both lodes, but they have proved to be very bunchy, and operation on a large scale will require the opening of a large extent of reserve ground. A diamond drill is now in use, exploring the southern part of the property. At the mill, two stamps were operated for the first quarter of the year; then three stamps for four months, but for the last five months of the year only one head was running. A closer selection of rock was made during the latter part of the year.

The directors' report says that operations during the year were largely confined to No. 2 shaft, and the results obtained were sufficient to provide for all expenses and to show a small surplus. It is proposed to continue thorough exploration of the property, and if the improvement in the copper market continues, to start up an additional stamp.

Atlantic Mining Company, Michigan.

The report of this company covers the year ending December 31, 1902. The general financial statement shows that the receipts for copper sold, at an average of 11.88c., amounted to $588,201. The working expenses, shown in detail in the table below, were $598,910, showing a deficiency for the year of $10,709. Other payments were $5,060 for interest:

$13,176 for exploration and $20,441 for improvements, bringing the deficit up to $49,386. Against this is to be credited the sale of tracks and rolling stock to the Baltic Mining Company, $17,788, and freight adjustments with the Baltic Company, $30,000; a total of $47,778, reducing the deficit for the year to $1,598. The surplus brought forward from 1901 was $95,700, making the net surplus at the close of the last year $94,102.

The statement of assets and liabilities shows that the total assets in cash, supplies and copper on hand were $306,756, against which there stood loans amounting to $160,000 and $52,654 bills and accounts payable, leaving a balance of $94,102, as above.

The mine statement shows that the work done during the year included 313 ft. sinking shafts; 102 ft. forks and winzes; 5,982 ft. drifting, and 23,190 fathoms stoping. The average cost of sinking shafts was $24.17 per foot; forks, $15.16; winzes, $9.89; drifting, $4.96 per foot; stoping, $3.98 per fathom. The summary of results shows that in all openings 25,764 fathoms of ground were broken. The rock stamped was 446,098 tons, yielding 6,847,270 lbs. mineral, or 4,949,366 lbs. of refined copper. The yield of rock treated was 11.095 lbs. of copper per ton stamped, or 0.5547 per cent. The values and costs per ton of rock treated and per pound of copper are shown in the following table:

	Per ton rock stamped.	Per lb. copper, cents.
Gross value of product	$1.3185	11.88
Cost of mining, selecting, etc.	$0.8914	8.03
Transportation to mill	0.0597	0.54
Stamping and separating	0.2503	2.26
Total mine expenses	$1.2014	10.83
Freight, smelting and selling	0.1411	1.27
Construction	0.0036	0.03
Total expenses	$1.3461	12.13
Deficit	$0.0276	0.25

Improvements at the mine included additions to the repair shop, the completion of the new boiler plant and new launders for disposing of the mill tailings. The surface plant is now in excellent condition, and will need no additions for some time to come. At the mill in addition to the rock stamped from the Atlantic Mine as above noted, there were 51,120 tons stamped for the Baltic, Champion and Winona mines.

The director's report says: "We have to record a great decline in the market price of copper, coupled with a continued low yield of the rock which, although close to that of the previous year, yet marks the lowest yield in the history of the mine. It seems useless to make any predictions about the future yield, but as the deepest workings are now showing more copper than for a long time past, some increase in the average yield may be reasonably expected, and we are encouraged by the increasing market value of copper to look for more favorable results during the current year.

"Our explorations on Section 16, in search of the Baltic lode, have been steadily prosecuted during the year, but have not yet been successful. The work is still proceeding, and should determine the location of this lode ere long.

"The corporate existence of the company, as first organized, expired December 31, 1902, and in accordance with the provisions of the laws of Michigan a vote of the stockholders was taken at the annual meeting on March 11, 1902, upon the question of continuing the corporate existence for a further period of 30 years, and also upon the question of increasing the capital stock of the company from 40,000 shares of $25 each, to 100,000 shares of $25 each; at which meeting 29,864 shares, or more than the necessary two-thirds, voted in favor thereof, and the proceedings required by statute to carry the same into effect have been fully complied with."

Delaware & Hudson Company.

This company owns a large estate in the anthracite region in Pennsylvania. It owns and leases an extensive system of railroads, extending from its mines to the Hudson River at Albany and northward into Vermont as far as Rutland and through New York to the Canada line. The tidewater coal shipped by the company reaches New York harbor over the Erie Railroad. The canal which the company formerly operated was abandoned finally three years ago. The report is for the year 1902, and is the 73d annual report of the company.

The total earnings—including railroad lines—were $22,500,794; total expenses, $16,880,892; net earnings, $5,619,902. Deductions were: Interest and rentals, $2,977,120; sinking fund of 5c. per ton of coal mined, $144,907; total, $3,122,027, leaving a surplus for the year of $2,497,875, or 7.13 per cent upon the stock.

The total shipments of anthracite coal reported for the year were 31,200,890 long tons. Of this the property of the Delaware & Hudson Company produced 2,898,139 tons, and that of the controlled Hudson Coal Company 229,559 tons; a total of 3,127,698 tons, or 10 per cent of the total. The coal transported over the company's railroads was 4,640,772 tons, against 7,571,298 tons in 1901; showing a decrease of 2,930,526 tons.

The general statement of earnings and expenses of the coal department is as follows:

	1901.	1902.	Changes.
Tons coal shipped	5,055,393	3,127,698	D. 1,927,695
Gross earnings	$16,924,933	$11,935,547	D. $4,989,386
Expenses	15,517,626	11,062,541	D. 4,455,085
Net earnings	$1,407,307	$873,006	D. $534,301
Gross earn., per ton.	$3.35	$3.82	I. $0.47
Expenses, per ton.	3.07	3.54	I. 0.47
Net earnings	$0.28	$0.28	.....

The expenses were made up as follows, the averages being based upon the tonnage of coal shipped:

	1901. Amount.	1901. Per ton.	1902. Amount.	1902. Per ton.
Mining & prep'r'g coal	$7,723,306	....	$5,809,648	....
Coal purchased	75,867	....	5,803	....
Coal sold from stock	.....	....	870,799	....
Total cost of mining	$7,799,173	$1.54	$6,686,250	$2.14
Transporting coal	6,992,244	1.38	3,708,484	1.19
Handling expenses	215,693	0.04	157,271	0.05
Gen. Exps., taxes, etc.	510,516	0.11	510,536	0.16
Total expenses	$15,517,626	$3.07	$11,062,541	$3.54

The coal sales in 1902 were made up as follows: At mines, $112,699; to railroad department, $746,544; at other points, $11,074,256; interest, $2,048; total, $11,935,547.

The report says: "At the beginning of the year your managers indulged the hope that the coal industry would share in the general prosperity of the country. The strike, however, which took place in May, brought our mining practically to a standstill, and it was not wholly resumed until the latter part of October. Meanwhile, the Commission appointed by the President has been carrying on an examination in reference to the justice of the demands of the miners. The testimony adduced seems to us to have been entirely in favor of the operators, and the figures for your company, compiled for the Commission by our comptroller and accepted by the representatives of the miners, show considerably in excess of the amount fixed by such representatives as constituting a reasonable annual wage. . . .

"On May 1, 1902, $1,850,000 debentures of the Hudson Coal Company, guaranteed by this company, were issued for the purchase of additional coal property. From 1903 to 1918 a fixed amount of these will be paid off each year. The operating expenses of that company bear the annual interest charges on all of its outstanding bonds, as well as a sufficient sum to retire the bonds maturing annually. . . .

"The managers take this means of expressing their appreciation of the service rendered by all the employees whose loyalty and diligence contributed to the welfare of the company, particularly of those through whose determination and self-sacrifice the coal property of the company was preserved from destruction. All those who were engaged upon the statements prepared for the Anthracite Commission are entitled to praise for the cheerful and willing manner in which they performed a very exacting and arduous service."

Lehigh Coal and Navigation Company.

This company owns a large estate in the anthracite region of Pennsylvania. It owns the Lehigh Canal and several short railroad lines connecting its properties. It also owns the Lehigh & Susquehanna Railroad, but does not operate that road, leasing it to the Central Railroad Company of New Jersey.

The income account for the year 1901 shows receipts as follows: Lehigh coal lands, $393,349; railroads, $73,414; miscellaneous, $217,510; rental of Lehigh & Susquehanna Railroad, $1,745,862; total, $2,430,135. The loss on canals was $77,036, leaving a balance of $2,353,099. Charges were: General expenses, $91,427; rentals, $179,725; taxes, $209,977; interest, $873,466; sinking fund—5c. per ton on coal mined—$48,636; damages to canal by flood, $222,558; total, $1,625,789, leaving a surplus of $727,310. From this dividends of 5 per cent, amounting to $717,333, were paid, leaving a balance of $9,977.

The total earnings of the Lehigh & Susquehanna Railroad, as reported by the lessee, were $5,237,584, of which $2,449,744 were from coal traffic. The coal traffic of the road and the Lehigh Canal was 3,946,170 tons, against 6,937,060 tons in 1901; a decrease of 2,990,890 tons. The distribution of this coal was as follows:

	1901	1902.
East of Mauch Chunk by Rail	5,867,394	3,710,026
East of Mauch Chunk by Canal	269,973	.....
On line above Mauch Chunk	193,441	108,931
To connecting lines above Mauch Chunk	606,252	127,213
Totals	6,937,060	3,946,170

The coal mined from lands owned and controlled by the Lehigh Coal and Navigation Company, with the average cost, etc., is reported as follows, in tons:

	1901.	1902.	Changes.
Coal shipped	1,741,548	972,712	D. 768,836
Coal used by company	163,947	139,415	D. 24,532
Total mined	1,905,495	1,112,127	D. 793,368
Per cent used by company	8.6	12.5	I. 3.9
Days worked	211.75	127.00	D. 84.75
Average mined per day	7,923	7,581	D. 342
Av. cost of coal per ton	$1.553	$1.854	I. $0.301

The proportion of large sizes—chestnut and over—and of the small or steam sizes produced at the company's collieries during the year was as follows:

	1901.	1902.	Changes.
Large sizes, per cent.	50.16	52.07	I. 1.91
Pea coal	13.34	13.77	D. 0.43
No. 1 buckwheat	14.69	12.36	D. 2.33
No. 2 buckwheat	21.81	21.80	D. 0.01
Total steam sizes	49.84	47.93	D. 1.91

The report says: "The cost of mining at the collieries owned by the company based on the production of all sizes, exclusive of the coal used by the company in its mining operations, and including, in addition to the regular mining expenses, all charges for extraordinary improvements, consisting of one new breaker completed, work on two new shafts, expenses in extinguishing fires, etc., was $2.03 per ton, against $1.733 in 1901. The increase in the cost of mining this year over last is entirely due to the interruption of our operations during the strike and the extraordinary expenses incurred in protecting and maintaining the property while the strike was in progress.

"Nine collieries were in operation during the year, except during the period covered by the strike. One colliery, No. 10, was restricted in its shipments during the first five months of the year on account of water in the lower levels, due to the heavy rains at the end of December, 1901, and in February, 1902. A new breaker at No. 6 colliery was completed during the year, the first coal being shipped from it on October 24. This work was delayed several months on account of the strike, and was not completed in time to test the capacity of the breaker before the close of the year. It is now preparing in the neighborhood of 1,200 tons per day. A new breaker, which was planned to prepare the coal from No. 5 colliery, was not completed during the year, work having been suspended during the strike, which effectually stopped all the work of enlarging and improving our collieries, it being impossible to secure mechanics for any purpose so long as it lasted.

"The past year will long be memorable in the annals of the anthracite trade, on account of the long

and complete strike among the workmen engaged in that industry, instigated by the recently formed unions in the coal region, known as the United Mine Workers of America."

After commenting at length on the strike, the report says: "At the beginning of the strike the company had a large stock of the small coal known as buckwheat No. 2, a large portion of which was loaded by workmen under guard, and sent to market, the shipments beginning early in July. The loading of this coal, and the operation of No. 4 and No. 12 breakers continued with an increasing daily output up to the end of the strike, which was declared off on October 24, the matters in dispute having been referred to a commission appointed by the President of the United States for investigation. On the resumption of work, orders were given that all the employees who had been faithful to us during the strike should be retained in their respective positions, and should be protected from any interference or insult by the former employees. These men, and the local officers and bosses of the company, are deserving of the thanks of the stockholders for their loyalty to the company and their faithful services during the dangerous experiences of the strike.

"Notwithstanding the interference with the work, and the great expense entailed by the protection of our property during the strike, the revenue from our coal operations was very satisfactory, and shows an increase over last year, which is accounted for by the fact that the large stock of small coal we had on hand and what was produced during the strike was marketed at satisfactory prices during its progress, and that a large business has been done at good prices since the resumption of work. These higher prices affect the junior sizes to a marked extent, which results beneficially to us, our production of these sizes being unusually large.

"The business of the canals shows a loss of $77,036, which was due to the almost entire suspension of business during the year. Early in the season this suspension was caused by damage to the canals by floods in the Lehigh and Delaware rivers; and for the remainder of the season by the stoppage of coal traffic, which is our principal source of revenue. The above stated loss was the cost of operating and maintaining the property, but does not include the cost of repairing damages caused by the floods. The tonnage for the year amounted to 28,589 tons, a decrease of 316,608 tons as compared with 1901.

"In the report to the stockholders for the year 1901, reference was made to the severe freshet in the Lehigh River of December 14, 1901, and to the plans for the necessary repairs to be made early this year. Before the season opened and the weather permitted these repairs to be made to any extent, the valleys of the Lehigh and Delaware rivers were visited by another flood, which in volume and extent of the damage inflicted was as great as any previous flood in the history of the company, and will probably be known as the 'great flood of 1902.' That of 1862 was the only other where the consequences were so disastrous, the damage in that case being more extensive on account of the destruction of the canal improvements between Mauch Chunk and White Haven."

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

NEGLECT TO DEVELOP OIL AND GAS PROPERTY WILL PREVENT EXTENSION OF LEASE.—Where one executes an oil and gas lease on royalty covering 74 acres of land, which was to run for the term of five years, and as much longer "as oil or gas was found in paying quantities"; and the lessee was required to complete a well on same within three months, which he did, but drilled no other wells, and made no serious effort to do so during the five years, although he was repeatedly so requested to do by the lessor; the well drilled being a small producer and pumped at intervals only, during the last year or two of the term not producing enough to pay the expenses of pumping; the court held that the lessee did not comply with the implied condition of the lease, which required him to develop the property in good faith; and a court of equity will not sustain and enforce the lease in his behalf after the expiration of the five years, as against the lessor and others to whom the premises had been leased after that time, and who had rendered the same productive.—Barnsdale v. Boley (119 *Federal Reporter*, 191); Circuit Court of the United States, District of West Virginia.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail prices. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Report of the Commissioner of Education for the Year 1900-1901. Volume 2. Washington; Government Printing Office. Pages, 1304.

Jaarbock van het Mijnwezen in Nederlandsch Oost-Indie. 1902. Prepared by the Mines Administration. Batavia, Java; published by the Colonial Government. Pages, 168; with maps.

The Induction Motor. Its Theory and Design. By H. Boy de la Tour. Translated from the French by C. O. Mailloux. New York; the McGraw Publishing Company. Pages, 250; illustrated. Price, $2.50.

Mexico Mining Directory. 1903. *Embracing the Principal Coal and Metal Mines and Metallurgical Plants in the Republic of Mexico.* San Francisco and Denver; the Western Mining Directory Company. Pages, 48. Price, $5.

Chemical Technology. Edited by W. J. Dibdin. *Volume IV,* including *Electric Lighting,* by A. G. Cooke, and *Photometry,* by W. J. Dibdin. Philadelphia; P. Blakiston's Son & Co. Pages, 380; illustrated. Price, $3.50, net.

BOOKS REVIEWED.

Table of Minerals. Including the uses of minerals and statistics of the domestic production. By S. L. Penfield, Professor of Mineralogy in the Sheffield Scientific School of Yale University. New Haven, Conn., 1903; Published for the author. Pages, 80.

This is a convenient and accurate synopsis of the various minerals, together with data concerning their uses and statistics, such as will be found extremely serviceable to the busy man. The author occupies the highest standing as a mineralogist, so that this neat-looking pamphlet is likely to find a wide distribution.

Report of the Bureau of Industrial and Labor Statistics for the State of Maine, 1902. S. W. Matthews, Commissioner. Augusta, Me.; State Printer. Pages, 220; illustrated.

A considerable portion of this report is occupied by an account of the year's work in the granite and lime industries of Maine. These, with some slate and a considerable clay industry, cover the mineral production. The granite and lime industries were generally prosperous last year, and the output was large. A chapter is given up to an account of the development of the great water power at Rumford Falls, where various industries have been established, including a very considerable chemical manufacture. We do not find, however, any reference in the report to the gold mines about which some correspondence recently appeared in our columns. Apparently, the commissioner has heard nothing of these exploitations as yet. An attempt was made last year to study the labor question, but with small results, owing to the great difficulty found in obtaining definite statistics from the labor unions.

The Art of Illumination. By Dr. Louis Bell. New York; The McGraw Publishing Company. Pages, 348; illustrated. Price, $2.50.

This book, which is the work of a gentleman who has written a great deal on electricity and its applications, is a study of the utilization of artificial light. The chapters treat respectively of Light and the Eye, Principles of Color, Reflection and Diffusion, Illuminants of Combustion, Incandescent Burners, Electric Incandescent and Arc Lamps, Shades and Reflectors, House Illumination, Lighting Large Interiors, Street and Exterior Illumination, Decorative and Scenic Illumination, Illumination of the Future, and Standards of Light and Photometry.

The book is intended to deal with the application of illuminants, and not with the problem of distribution. Moreover, it treats of the illuminants themselves only so far as a knowledge of their peculiarities is necessary to their intelligent use. The discussion is rather of general principles and very few examples of actual application have been given, in order to save space and bring the work within reasonable bounds. There is a further object in this, since the general principles of the application of light—that is the art of applying the materials at hand—may be reduced to fairly well defined laws, which remain practically unchanged whatever alterations may be made in the science of producing light. The author has succeeded in following this outline of general purpose, and has produced a book which ought to interest a good many people.

Maps of the States of Mexico. Compiled by Geo. D. James. Denver, Colo.; George D. James. Blue-prints, 25 by 30 ins. Price, $3 each.

Maps of Mexico are not always easy to obtain, especially in a form convenient for use, and those before us seem to be carefully prepared, and in a form which will make them very serviceable. They give the general topography, with towns, cities, railroads, roads and rivers, mining establishments and the like. Mountains and differences of level are clearly indicated. The maps have been made from compilation and comparison of older maps, surveys and other data, the work extending over five years. An examination shows, where it has been possible to make comparisons, that the work has been done very carefully and correctly.

As the maps are not engraved, but are blue-prints, they can be constantly added to. Mr. James informs us that, while many purchasers are satisfied with the maps as they now stand, others have suggested that additional data be inserted—such as location of mines, line of proposed railroads, etc. He states that all such suggestions are welcome as aids in making the maps more complete; and that requests for the insertion of information can always be made by parties ordering copies.

The list of maps prepared includes 26 States, as follows: Sonora, Chihuahua, Durango, Sinaloa, Nuevo Leon, San Luis Potosi, Coahuila, Guanajuato, Zacatecas, with Aguas Calientes, Tamaulipas, Vera Cruz, Lower California, Oaxaca, Hidalgo, Queretaro, Chiapas, Tabasco, Michoacan, Jalisco with Colima, Tepic, Mexico, Federal District of Mexico, Puebla with Tlaxcala, Guerrero with Morelos, Yucatan, Campeachy. In addition, Mr. James has prepared a map of the rubber, coffee and sugar country of Mexico, in Oaxaca, Vera Cruz, Chiapas and Tabasco, the size of the latter map being 32 by 40 ins., and its price, $5.

These maps should be appreciated by all who are interested in Mexican property. They are exceedingly useful, as we have already found.

Dies, Their Construction and Use. For the Working of Sheet Metal. By Joseph V. Woodworth. New York; Norman W. Henley & Co. Pages, 384; illustrated. Price, $3.

We have frequently referred to the increased use of the power press for the production of articles of sheet metals, and we have also spoken of the extent

ro which sheet metal has taken the place of cast iron and malleable iron for the manufacture of hardware and other metal articles. A large part of this advance is due to the use of dies in connection with the press, so that the subject has become one of considerable importance in the working of sheet metal. Dies are now being adopted for use in the stamping of a great number of articles which were formerly either cast or forged, and naturally a great variety of them are coming into use. The subject of dies has heretofore been treated only in an incidental way, and we believe that this is the first important book devoted entirely to the construction and use of dies. The author's object has been to treat the subject in a practical way, with a view to making his work useful to manufacturers and to superintendents, foremen and others in metal working establishments.

The historical part has been cut down to very small dimensions, which is in accordance with its general plan. It is of much more importance to know how the art stands to-day than what it has been, and that the machines and appliances illustrated should be of the latest type in successful use. A very large number of engravings of dies, presses, fixtures and other sheet metal working devices, from the simplest to the most intricate, are given; and the author has generally described their construction in a very clear and simple way, which can be readily understood. Mr. Woodworth is able to write from a thoroughly practical standpoint, inasmuch as he himself has been concerned in the manufacture of dies, and has designed, made and used many of the machines illustrated and described in the book. It appears to us that it is a thoroughly practical and useful work, and ought to be well appreciated by those for whom it is written.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested. Letters should be addressed to the MANAGING EDITOR. We do not hold ourselves responsible for the opinions expressed by correspondents.

Power from the Anthracite Mines.

Sir.—I notice in the New York *Herald* of March 22, an article on the possibilities and probabilities of the employment of anthracite coal at the mines for the generation of electrical power. In the usual sensational paper style, though perhaps with more foundation than most of such articles, the writer describes a plan for using the coal as mined at convenient points in large electrical installations, and the transmission of power by wire to New York. The plan is credited to Mr. Watkins, of the Coal Commission. While it is quite probable that Mr. Watkins may have given some notes on the point to the paper in question, I am quite sure that he is too well posted on the history and literature relating to the anthracite mines to claim originality in this matter. The use of coal directly from the mines, either in electrical power plants or for conversion into gas, was advocated, as most readers of the ENGINEERING AND MINING JOURNAL know, by the late R. P. Rothwell in its columns years ago. I remember reading his articles with interest at least eight or ten years back, although I cannot from memory fix the exact date. Moreover, Mr. Rothwell did not claim to have originated the idea, which I think came, in the first place, from the fertile brain of the late Eckley B. Coxe.

I have no doubt that by some such plan a great saving in consumption and transportation could be effected, although I am not clear as to whether the generation of electricity for transmission, or the manufacture of fuel gas to be forwarded by pipe lines would be the more economical. Possibly, both plans can be used. Of course, as has been pointed out, the consumption of coal at the mines would avoid the expense of sizing and preparing the coal, and would make possible the consumption of a great deal of the slack and dust which now go into the waste heaps. It is not necessary, however, to dwell on these points, as I merely wished to show that the idea was not by any means a new one.

ANTHRACITE.

New York, March 23, 1903.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Tin Dross or Residues.—We would thank you to advise us, through your columns, concerning the best method of the smelting and reduction of tin dross or residues, with especial reference to the fluxes and fuels required; or to indicate where we can obtain the information.—M. H.

Answer.—We know of no special work which describes the smelting and reduction of tin dross or residues, although in Flander's "Galvanizing and Tinning," published by the David Williams Company, of New York, price $2, will probably be found at least a reference to the methods and general uses for treating the by-products of smelting and tinning.

Molybdenum.—1. What are the principal uses of molybdenum, and how much of it is used a year? 2. How is the metal obtained from molybdenite, and is there any mine at present in operation where a low-grade ore is mechanically concentrated or by any other method? 3. Has the Elmore oil process ever been used commercially for molybdenite ore? 4. Roughly, what is the cost of the metallurgical process by which Mo or MoO_3 is produced, after the mine ore (say, a low-grade ore) is delivered to the works?—W. D. V.

Answer.—1. Molybdenum is used chiefly in making special steels. In 1901 there were 35,000 lbs. of molybdenum and 16,000 lbs. of ferro-molybdenum used in the United States. In 1902 the quantity was about the same.

2. The process of obtaining the metal from the ore is in the hands of a very few parties, and no details have ever been published. In preparing the ore for shipment concentration in some form is generally used. The demand for the ore is so small that it cannot be said that any mine is in regular operation producing it.

3. The Elmore oil process has been found well adapted to concentrating molybdenite. See the articles on that process in the ENGINEERING AND MINING JOURNAL, February 14 and 21, 1903.

4. No particulars as to cost of reduction at works can be obtained.

Cobalt and Cobalt Ores.—Would you be kind enough to answer either through the columns of your paper the following questions in regard to cobalt and cobalt ores? 1. What is the consumption of cobalt in the United States? In the world? 2. What is the principle source of supply? What is the average tenor of the ore? 3. What are the principal uses to which cobalt or its compounds are put? 4. Are there reduction works for cobalt ores in this country? If so, where are they located? Where are the foreign reduction works located, and what are their names? 5. What per cent of cobalt is it necessary for an ore to carry in order to be received by the smelters? What is cobalt worth per pound in the ore? Who are the principal consumers of cobalt or its compounds in this country? What is the best work on the reduction of cobalt in English? In a foreign language?

The data on this subject seems to be quite limited. —C. B. N.

Answer.—Your questions are numerous and rather comprehensive, but we will endeavor to answer them in detail.

1. Cobalt is used chiefly in the form of oxide. In 1901 the production of cobalt oxide in the United States was 13,360 lbs., while 71,969 lbs. were imported, making a total supply of 85,329 lbs. No statistics are obtainable for the production in England and Germany, the makers in those countries having formed a combination, and keeping the figures to themselves.

2. The principal supply in this country is from ores obtained from the Mine la Motte in Missouri. Cobalt is obtained in connection with nickel in Silesia. The chief supply of ores at present comes from New Caledonia. These ores vary from 3 to 8 per cent cobalt in tenor; 5 per cent ore is the shipping grade.

3. The chief use of cobalt is in manufacturing pigments. Cobalt blue is well known as a color which is used for some special purposes.

4. Cobalt oxide is made in the United States only by the American Nickel Works at Camden, N. J. In France, the Maletra Works are at Rouen. Messrs. Vivian at Swansea are the chief makers in England. In Germany there are several works, which produce the oxide, chiefly as a by-product.

5. As we have noted above, the shipping grade of New Caledonia ore is 5 per cent. In this country and Germany, the cobalt oxide is obtained chiefly in connection with other metals, chiefly nickel. The only quotation for ores we have been able to obtain is an English one; that was about $9 per long ton per unit of metal, for ores containing a minimum of 4 per cent CoO. The demand is small, and any considerable increase in supply would result in much lower prices.

6. The chief buyers are the manufacturers of paints and enamels.

7. Literature on the subject of cobalt is very limited. The treatment and production of the metal is not of sufficient importance to call out much special writing. In all the works on metallurgy there is some reference to cobalt, usually in connection with nickel. There are notes on cobalt and cobalt ores in *The Mineral Industry*, Vols. I, VII and X. No special book on the subject is in existence.

AMENDMENTS TO THE PATENT LAWS.

The last Congress passed several amendments of some importance to the Patent Laws just before its adjournment. The bill was finally passed and signed by the President on March 3. The changes consist in amendments to four sections of the Revised Statues—4887, 4892, 4896 and 4902. The purpose of these amendments is to bring our patent laws into accordance with the provisions of the international agreement concluded by the Convention for the International Protection of Industrial Property, which was held in Brussels in the latter part of the year 1900. The parties to the convention included all the important nations of Europe, with the exception of Germany.

Section 4887, which relates to the granting of United States patents for inventions already patented in other countries, extends the time during which an inventor can obtain a patent after filing his application in another country, from seven to twelve months. This section as amended reads as follows:

"An application for patent for an invention or discovery or for a design filed in this country by any person who has previously regularly filed an application for a patent for the same invention, discovery or design in a foreign country which, by treaty, convention, or law, affords similar privileges to citizens of the United States shall have the same force and effect as the same application would have if filed in this country on the date on which the application for patent for the same invention, discovery or design was first filed in such foreign country, provided the application in this country is filed within twelve months in cases within the provisions of section 4886 of the Revised Statutes, and within four months in cases of designs, from the earliest date on which any such foreign application was filed. But no patent shall be granted on an application for patent

for an invention or discovery or a design which had been patented or described in a printed publication in this or any foreign country more than two years before the date of the actual filing of the application in this country, or which had been in public use or on sale in this country for more than two years prior to such filing."

Section 4892 is amended by extending the number of persons before whom inventors' affidavits may be taken. Formerly such affidavits were required to be taken before any minister, charge d'affaires, consul, commercial agent holding a commission under the Government of the United States, or notary public, but this requirement has been given greater elasticity by the addition of any "judge, or magistrate having an official seal and authorized to administer oaths in the foreign country in which the applicant may be, whose authority shall be proved by certificate of a diplomatic or consular officer of the United States."

Section 4896, which relates to the rights of executors and heirs to carry into effect the work of a deceased inventor, is extended, and given international force by the addition of the following paragraph:

"The executor or administrator duly authorized under the law of any foreign country to administer upon the estate of the deceased inventor shall, in case the said inventor was not domiciled in the United States at the time of his death, have the right to apply for and obtain the patent. The authority of such foreign executor or administrator shall be proved by certificate of a diplomatic or consular officer of the United States."

Section 4902, which relates to caveats, is radically changed. The provision formerly applied to "any citizen of the United States," but now has been changed to read "any" person; so that foreign inventors will have the right to file a caveat, which has heretofore been limited to citizens of the United States. Section 4902 now reads as follows:

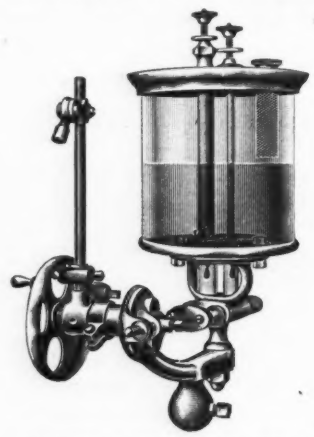
"Any person who makes any new invention or discovery and desires further time to mature the same may, on payment of the fees required by law, file in the Patent Office a caveat setting forth the design thereof and of its distinguishing characteristics and praying protection of his right until he shall have matured his invention. Such caveat shall be filed in the confidential archives of the office and preserved in secrecy, and shall be operative for the term of one year from the filing thereof; and if application is made within the year by any other person for a patent with which such caveat would in any manner interfere, the commissioner shall deposit the description, specification, drawings and model of such application in like manner in the confidential archives of the office and give notice thereof by mail to the person by whom the caveat was filed. If such person desires to avail himself of his caveat he shall file his description, specifications, drawings and model within three months from the time of placing the notice in the post office in Washington, with the usual time required for transmitting it to the caveator added thereto, which time shall be indorsed on the notice."

The object and importance of these changes will be readily seen; although they apply chiefly to the facilities given to foreign inventors, they may affect in some cases claimants resident in the United States. They were, in fact, required by the terms of our agreement with other countries.

THE MANZEL LUBRICATOR PUMP.

Although the principle of all lubricator pumps is practically the same, new types are from time to time placed on the market. One of these is illustrated herewith.

The pump is situated in the lower part of the device, the driving mechanism consisting of a lever adapted to oscillate about an axis, and provided with means for coupling it to any reciprocating mechanism; a rotary device driven by the lever through a clutch action, and a disc crank and a slotted cross-head on the pump plunger driven by the crank. A sight-feed tube is fitted in the suction pipe, by which the rate of feed can be visually ascertained. The pump is surmounted by an oil reservoir made of glass, within which is fitted the suction pipe from the pump, to which is fitted a regulating valve provided with screw adjustment and lock-nut situated on the top of the reservoir cover by which the supply of oil can be regulated. The



MANZEL LUBRICATOR PUMP.

pumps are manufactured by Manzel Brothers, Buffalo, N. Y., in sizes of from one-third of a pint to one gallon, with from one to six feeds.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the Engineering and Mining Journal upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the Journal in which notice of the patent appeared.

Week Ending March 17, 1903.

722,685. FRICTION DRIVING MECHANISM FOR ROLLING MILLS.—Carl A. Erbslöh, Barmen, Germany. A friction driving mechanism comprising a driving cog-wheel, an object to be driven provided with a cylindrcal part and a shoulder, a second cog-wheel loosely seated upon said cylindrical part of the object to be driven and meshing with the first-named cog-wheel.

722,720. CONVEYER-CARRIAGE.—Frank H. Lamb, Hoquiam, Wash. In a conveyor-carriage, a frame having carrier-wheels journaled therein, a brake-shoe pivotally mounted in said frame by links pivoted at opposite ends to the shoe and frame, means for operating said shoe, and a line extending to a fixed point for operating said operating means.

722,749. PUMP.—Lucius J. Phelps, Melrose, Mass. The combination, with a pump, means for maintaining a predetermined pressure upon the same in the direction of its delivery-stroke, and a delivery-pipe connected to said pump, of a pneumatic cushioning device in communication with the delivery-pipe, said cushioning device consisting of a pair of communicating chambers with an interposed liquid seal.

722,759. METHOD OF SUBDIVIDING BLOCKS OR INGOTS.—Jos. Scales, Niagara Falls, N. Y., assignor to Union Carbide Company, Niagara Falls, N. Y. A method of subdividing heated blocks or ingots, which consists in locally subjecting the heated block to the action of a reagent capable of effecting disintegration of the material to form a cavity therein, and then breaking the block through said cavity.

722,762. PROCESS OF SEPARATING PRECIOUS METALS FROM SOLVENT SOLUTIONS.—John P. Schuch, Jr., Cripple Creek, Colo. A step in the process of separating precious metals from their solvent solutions, which consists first in neutralizing any free acid contained in the solution, and then any compound formed during the neutralization of the acids.

722,770. PYROMETER.—Frederick W. Taylor and Henry L. Gantt, South Bethlehem, Pa., assignors to the Bethlehem Steel Company, South Bethlehem, Pa. As a means of ascertaining the temperature of highly-heated receptacles, the combination with a furnace or other heated receptacle, of a straight tube having a closed end situated within the receptacle and exposed to the heat thereof, and an open end situated outside of the receptacle and through which the color and light intensity of the light-rays directly radiated from the closed end to the open end can be observed.

722,778. ANCHORING DEVICE FOR DRILLING-MACHINES.—Isaac Wantling, Peoria, Ill., assignor to Wantling's Favorite Coal Drill Company, Peoria, Ill. An anchoring device for drilling-machines, comprising a member having a tapered body and a reduced rear body thereof, a supplemental extension of the tapered body either of circular or polygon form lying parallel with the reduced body part, a notch or perforation cutting through a portion of said extension, a machine part arranged to have connection with said extension and provided with a notch in its body arranged to be engaged by a pin or similar device inserted through the notch or perforation of the extension for retaining the member and machine part in a locked relation.

722,782. APPARATUS FOR MAKING CONCRETE.—Charles R. Weaver, Baltimore, Md., assignor to Peter C. Hains, Jr. The combination of a plurality of top hoppers to receive and hold material arranged in layers, each of said top hoppers being provided with a discharge-opening, a storage-bin arranged above the top hoppers and having a plurality of compartments for holding different materials, a discharge-opening for each compartment and means for discharging material from the compartments of the bin into any one of the plurality of top hoppers.

722,783. APPARATUS FOR DISCHARGING PULVERULENT, GRANULAR, OR LIKE SUBSTANCES.—Albert Weiss, Zurich, and Louis Giroud, Olten, Switzerland. The combination with a storage-bin having a discharge-hopper; of an unconfined substantially horizontal table with unobstructed upper face of greater superficial area than the cross-sectional area of said hopper below and parallel to the lower edges of the side walls of the hopper and distanced therefrom in proportion to the talus formed by a given material supported on said table, and means for shaking the same.

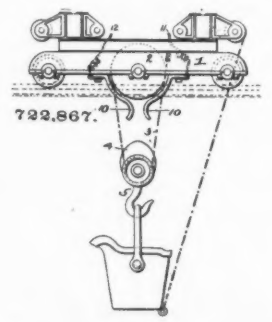
722,791. MANUFACTURE OF EARTHENWARE.—Edward G. Acheson, Niagara Falls, Canada, assignor to The Acheson Company, Niagara Falls, N. Y. A new manufacture of earthenware, resulting from treating a body material with a modifying agent having effects like those due to the effects of tannin thereon, possessing the characteristics of increased strength and plasticity and decreased absorption of water and shrinkage in drying.

722,792. METHOD OF PRODUCING COMPOUNDS CONTAINING SILICON, OXYGEN, AND CARBON.—Edward G. Acheson, Stamford township, Canada, assignor to The Acheson Company, Niagara Falls, N. Y. A method which consists in heating a suitable mixture containing carbon and silica under the conditions substantially as described to form a product consisting essentially of silicon, oxygen and carbon in chemical combination.

722,793. REFRACTORY MATERIAL.—Edward G. Acheson, Stamford township, Canada, assignor to The Acheson Company, Niagara Falls, N. Y. A self-binding material composed essentially of silicon, oxygen and carbon in chemical combination.

722,809. METHOD OF TREATING ORES.—Franklin R. Carpenter, Denver, Colo., assignor of one-half to Joseph H. Berry, Detroit, Mich. A process of treating dry siliceous ores containing precious metal which consists in smelting them with sulphur, copper and a basic flux, subjecting the matte produced to an oxidizing roast then resmelting the product with a siliceous flux, thereby producing black copper containing the precious metal and a rich slag, adding the rich slag to a subsequent charge of ore, adding to the black copper metallic lead, subjecting the mixture to heat and an oxidizing blast thereby forming coppery litharge and a residue consisting mainly of precious metal, separating the two, smelting the coppery litharge with a sulphur-bearing material, and other reducing agents, thereby producing metallic lead and matte, and finally smelting the matte, producing metallic copper.

722,867. MEANS FOR PREVENTING THE OVERWINDING OF HOIST CHAINS OF CRANES.—George Mitchell, Naco, Ariz. The combination with the winding-drum



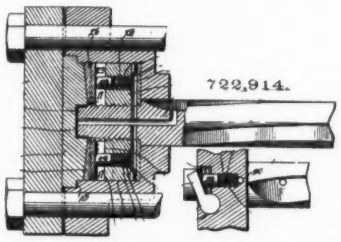
and a sheave to be raised thereby, of an electric motor for operating said drum, an electric circuit including the motor, and electrically-operated means controlled by said sheave for automatically opening the motor-circuit when the sheave rises to a predetermined height.

722,831. CRUCIBLE SMELTING-FURNACE.—Otto Forsbach and Eduard Clerc, Mülheim-on-the-Rhine, Germany. In a crucible smelting-furnace, a crucible suitably supported above the grate-bars with a receiving portion arranged above the crucible and communicating therewith, the receiving portion having an outlet extending thereinto above the material in the receiving portion, a cover arranged on the receiving portion, means for permitting the fuel to be fed around the crucible, the heat rising from the fuel, entering the receiving portion, directly engaging the material in the receiving portion previous to its exhaust through the said outlet.

722,857. TANNING PROCESS.—Morris C. Lamb, Bermondsey, England, assignor to Peter Spence & Sons, Limited, Manchester, England. A process for converting animal hides and skins into leather, which consists in treating the prepared goods free from grease, with a solution of a titanium compound until the required tannage is produced.

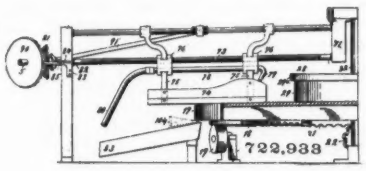
722,868. OVERHEAD TRAVELING CRANE.—George Mitchell, Naco, Ariz. In an overhead traveling crane the combination with a traveling bridge, of a trolley thereon, a main hoisting-drum and its chain carried by the trolley and an auxiliary hoisting-drum and chain on each side of the main hoisting-drum.

722,914. ROCK-DRILL.—Vincent Schneider, Trimountain, Mich. The combination in a rock-drill-rotating mechanism, of the rifle-bar, a cylindrical pawl carrying head secured thereto and provided on its rear face with pawl-receiving recesses, pawls pivotally disposed in said recesses, pin-receiving openings formed in the head at points under said pawls and in communication with the air or steam space of the cylinder of the drill, pins adapted to said openings and



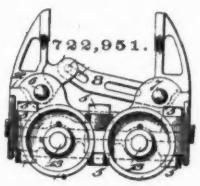
serving to hold the pawls in operative position, and a ratchet-disk for engagement with said pawls.

722,933. ORE-CONCENTRATOR.—Pas. B. Arthur, Kansas City, Mo. In an ore-concentrating machine, a table, a knife or scoop arranged to remove accumulations of ore, mud,



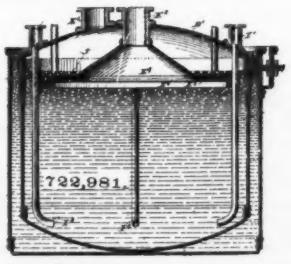
etc., upon the table, parallel worm and guide-rods, a frame secured to the knife or scoop and engaging the worm and guide-rods, and means for rotating the worm and causing advance or retrograde movement on the part of the scoop or knife.

722,951. SINGLE-CABLE MINE-HAUL.—Carson W. Damron, Fairmont, W. Va., assignor to the Wagner-Palmros Manufacturing Co., Fairmont, W. Va. A single-cable mine-haul, comprising an endless cable traveling around guide-sheaves, lying in substantially horizontal planes, and dogs



mounted at intervals upon said cable, having arms projecting vertically from the cable and constructed to engage both in front and rear of a portion of a car, so as to confine the car relatively to the cable in both directions.

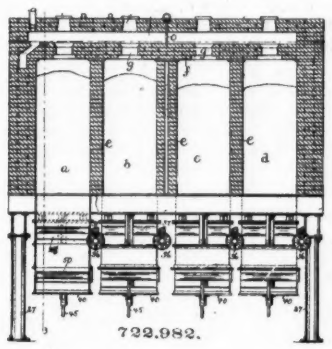
722,981. PROCESS OF MAKING SULPHURIC ACID.—John B. F. Herreshoff, New York, N. Y., assignor to General Chemical Company, New York, N. Y. A process of manufacturing sulphuric acid, which consists in causing sulphuric anhydride to be absorbed by a body of liquid



acid and simultaneously supplying a diluting agent in sufficient quantity to maintain the liquid acid at its original degree of concentration, so that from the start of the operation to the discharge of the finished product, the strength of the sulphuric acid remains unaltered.

722,968. AIR-COMPRESSOR.—Benjamin Gastal, Pelotas, Brazil. The combination of two casings or chambers each having an air-passage at the top, a liquid-passage at the bottom, a liquid-inlet adapted to communicate with said liquid-passages, and two liquid-outlets adapted to communicate with the respective liquid-passages, a float located in each casing and pivoted at one end to a fixed part of the casing, a set of connected valves controlling the connection of said liquid-passages with the respective outlets and with the inlet, a shifting-lever fulcrumed in the lower part of each chamber, a rod connecting the other end of each float with an arm on the shifting-lever, the said levers being operated by the floats and arranged to actuate the valves, and a spring for throwing each lever quickly when it passes its central position.

722,982. COKING OVEN.—Louis J. Hirt, Brookline, Mass. In combination, a plurality of vertically-arranged coking-chambers, a main flue or passage located above said coking-



chambers and communicating therewith, an auxiliary flue or passage communicating with the said main flue, and means to close the main flue intermediate said coking-chambers.

723,000. AIR COMPRESSOR.—Mark W. Marsden, Philadelphia, Pa., assignor to Frank S. Cobb, Cleveland, Ohio. A machine comprising a cylindrical casing having inlets and a carrier provided with hinged vanes or wings and arranged within and eccentrically of said casing and one of said parts being rotatable in respect to the other, said carrier having a chamber formed therein, and passages communicating with said chamber and valves in said passages arranged to be operated by the wings.

723,001. COMPOUND AIR-COMPRESSOR.—George W. Marsh, Oakland, Cal. The combination in a fluid-compressor, of main impelling and compressor cylinders with connected pistons moving in unison, and inlet and discharge valves therefor, and supplemental impelling and compression cylinders, connected pistons movable therein, and valves whereby the exhaust from the first impelling-cylinder is admitted to drive the piston in the second, and valves through which partially-compressed air is delivered from the second compressor-cylinder to the first compressor-cylinder.

723,015. WALL-PLASTER.—William H. Orr, Lima, Ohio. A composition of matter for wall-plaster consisting of water-granulated dry furnace-slag, natural cement, Portland cement, fire-clay, calcined gypsum, wood fiber, and stucco-retarder.

723,026. GRIPPING ATTACHMENT FOR OIL-WELL PUMP RODS.—James W. Rhoades, Fostoria, Ohio. A grip comprising a back member vertically grooved and transversely perforated and a grip-block vertically grooved to co-operate with the vertical groove of the back member to inclose the polish-rod and having in its front side a segmental groove curved in cross-section, in combination with a U-shaped bolt engaging the segmental groove in the front side of the grip-block and extending through the perforation of, and having nuts engaging the rear member of the grip.

723,094. FURNACE-CHARGING APPARATUS.—Charles H. Wellman, Cleveland, Ohio, assignor to the Wellman-Seaver Engineering Company, Cleveland, Ohio. In apparatus for charging furnaces with molten metal, the combination of a wheeled truck constructed to run upon rails below the charging-door of the furnace and having a ladle pivotally mounted thereon, with a wheeled structure mounted independently of the ladle-truck, hoisting mechanism on said structure, and interposed tackle whereby said hoisting mechanism can be connected to the ladle so as to tilt the same.

723,105. PROCESS OF RECLAIMING FLUE-DUST.—Edward H. Williams, Sharon, Pa. A process of recovering flue-dust of iron ore consisting in fusing it with free silica in the absence of blast.

723,106. SILICATED FLUE-DUST.—Edward H. Williams, Sharon, Pa. A composition of matter consisting of uncombined iron oxide and iron silicate free from impurities.

723,122. HYDRAULIC DREDGE.—John Andersen, Gulfport, Miss. In a dredging apparatus, the combination, with a boat, of a U-shaped frame pivoted at the rear ends of its legs upon the sides of the hull, a hollow head, forming the outer end of said frame, and provided with points for digging, and with openings for the ejection of water, a water-conducting pipe and a suction-pipe connected with said head, and extending back on the sides of the hull and having flexible portions which permit their elevation and depression along with the frame.

723,124. COMPOSITION.—George F. Averill, Arverne, N. Y., assignor to William C. Lynne and Joseph A. Frauenheim, Pittsburg, Pa. An artificial lumber consisting of paper-dust, magnesium oxide, and magnesium chloride.

723,158. PROCESS OF TREATING NICKEL ORES, ETC.—Thomas Jenkins, Webster, N. C., assignor to Walter S. Adams, Waynesville, N. C. A process of treating nickeliferous material, which consists in subjecting said material to the action of a suitable solvent, precipitating iron from said solution, precipitating nickel from said solution as nickel sulphide, converting said nickel sulphide into the oxide of nickel, and converting said oxide of nickel into the sulphate of nickel.

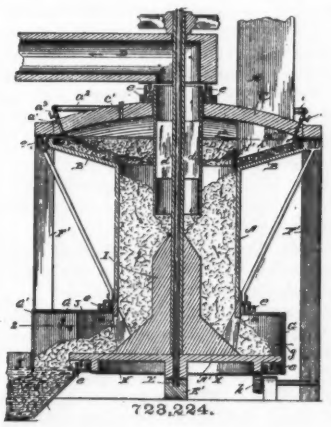
723,159. PROCESS OF TREATING NICKEL ORES, ETC.—Thomas Jenkins, Webster, N. C., assignor to Walter S. Adams, Waynesville, N. C. A process of treating nickeliferous material, which consists in subjecting said material to the action of a suitable solvent, precipitating nickel from said solution as a salt of nickel easily reducible to nickel oxide, and reducing said nickel salt to nickel oxide.

723,197. PROCESS OF REMOVING TIN FROM THE SURFACE OF OTHER METALS.—Asahel K. Eaton, New York, N. Y., assignor to Hugh M. Eaton, Brooklyn, N. Y. A method of detinning tin-plate which consists in heating the tin plate in a bath of sodium bisulphate to form a compound of tin, and separating out the tin in metallic form.

723,212. METHOD OF TREATING ORES.—Paul A. Knappe, Grantville, Ga., assignor to American Amalgamating Company, Boston, Mass. A process of treating ores which consists in continuously feeding pulp to a settler and grading the same therein, continuously withdrawing each of the lighter strata before contact with mercury, causing mixing contact of the heaviest pulp particles with mercury, discharging the non-amalgamable portion thereof, and separately recovering the values from the different grades withdrawn from the settler.

723,217. MANUFACTURE OF TITANOUS CHLORIDE.—Howard Spence, Manchester, England. A process of obtaining titanous chloride from titanic chloride, which consists in subjecting an aqueous solution of titanic chloride to the action of an electric current between a cathode and an anode in an electrolytic cell divided by a porous partition into a cathode-compartment and an anode-compartment, the titanic-chloride solution being contained in the cathode-compartment while the anode-compartment contains a dilute-acid solution.

723,224. GAS-PRODUCER.—Frederick W. Matthiessen, Lasalle, Ill. A gas-producer chamber having a central, lower part and an enlarged, upper part provided with a cover



common to both parts, the bottom of the upper part being connected with the upper part of the central, lower part and adapted to retain fuel in the upper part distinct from the fuel in the central, lower part.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending February 28, 1903.

2,545 of 1902. STEEL CONVERTER.—C. Raapke, Gustrow, Germany. A converter for making steel, with a flat bottom and separate discharges for the metal and the blast.

4,380 of 1902. MINERS' LAMP.—G. Shemwell, Merthyr Tydfil. Small accumulators attached to the bottom of miners' oil lamps for the purpose of igniting the wick.

20,271 of 1902. ORE CRUSHER.—J. E. and J. Broadbent, Staleybridge. Improved construction of the cylinders of the inventor's ore crushing machine.

22,927 of 1902. MINE CAGE SUSPENSION.—G. T. Hann, Treherbert. Improved safety suspension apparatus for mine cages.

25,893 of 1902. MAGNETIC SEPARATOR.—C. E. Knowles and G. T. Young, Carthage, Mo., U. S. A. Improvements in magnetic ore separators to treat ore of varying magnetic susceptibilities in one operation.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mr. A. Chester Beatty has returned to Denver, Colo.

Mr. William D. Thornton, of Butte, Mont., is in New York City.

Mr. Fred Hills, of Cripple Creek, Colo., is visiting New York City.

Mr. J. Trowbridge Bailey has returned to New York City from Mexico.

Mr. E. R. Abadie is manager of the Champion Mine at Nevada City, Cal.

Mr. A. G. Charleton has left London for West Australia on professional work.

Mr. James Macfarlane is in New York City on a brief visit from Cerro de Pasco, Peru.

Mr. George H. Robinson, of Salt Lake City, Utah, is at the Manhattan Hotel, New York.

Mr. Alfred Tilly is manager of the Frontino & Bolivia Mines, at La Salada, Colombia.

Mr. D. McVichie has returned to Salt Lake City, Utah, after a visit to Boston and New York.

Mr. Frank Klepetko is expected back from Cerro de Pasco by the *Seguranca*, arriving on March 25.

Mr. Stanley H. Pearce has opened an office as consulting mining engineer at Magdalena, Sonora, Mex.

Mr. John B. Farish is at the Engineers' Club, having arrived in New York City during the past week.

State Geologist Blatchley, of Indiana, has reappointed Mr. James Epperson mine inspector for two years more.

Mr. Charles B. Kingston, formerly of Aspen, Colo., and now from Kalgoorlie, West Australia, is in New York City.

Mr. Peter Kirkegaard, manager of the Canadian Gold Fields Company at Deloro, Ont., has been in New York for a few days.

Mr. W. W. Davis, vice-president of the Yak Company, of Leadville, Colo., was in Kansas City, Mo., the past week on mining business.

Mr. Courtenay De Kalb, of Boston, Mass., who has recently been directing operations at the Fernando Mine at Durango, Mex., is now in New York City.

Mr. Titus Ulke is now assistant to the manager of the Clavion and Highland mills of the New York & Pennsylvania Company, at Johnsonburg, Pa.

Mr. Alexander T. Hill, formerly manager of the Mountain Copper Company at Keswick, Cal., is now in charge of the Le Roi No. 2, at Rossland, B. C.

Mr. Edwin E. Chase, mining engineer, of Denver, Colo., returned recently from New Mexico, and was last week at Idaho Springs on professional business.

Col. T. G. Bush, president of the Alabama Consolidated Coal and Iron Company, and also of the Shelby Iron Company, is in California enjoying a needed vacation.

Wr. W. B. Duvall, formerly manager of the Boston Gold Copper Smelting Company, at Leadville, Colo., has returned to Colorado after an extended visit to New York City.

Mr. Martin J. Heller, mining engineer for Capt. J. R. De La Mar, recently returned to San Francisco, after a trip to Southern Mexico, New York and the Virginia and North Carolina copper belt.

Mr. George F. Shurtliff, of Prescott, Ariz., has been in Denver, Colo., during the past week to purchase machinery for the mill which is to be constructed there for the Crown King Mine.

Mr. Albert P. Wills, lately associate in applied mathematics and physics at Bryn Mawr College, has been appointed instructor in mechanics and mathematical physics at Columbia University.

Mr. J. M. Moore, general manager of the Union Pacific Coal Company, and Mr. C. P. Kittle, general manager of the Kemmerer Coal Company, both of Salt Lake City, have been in Butte, Mont.

Mr. Reginald Heath, foreman at the Consolidated Mercur Mine in Utah, is now underground foreman at the Daly-Judge Mine, under the new superintendent, Mr. Newt. A. Dunyan, formerly assistant superintendent of the Daly-West.

Mr. Robert G. Reilly, formerly connected with the Liberty Bell Company, of Telluride, and with the Dorcas Mill, of Florence, Colo., is at present superintending the construction of the George Process mill for copper ore at Williams, Ariz.

Mr. Joseph Larmor has been elected Lucasian professor of mathematics at Cambridge University in succession to the late Sir George Gabriel Stokes. Mr. Larmor is secretary of the Royal Society, and his most important work is "Ether and Matter."

Mr. J. P. Evans, of the Colorado Iron Works, Denver, returned there a few days ago, after completing the construction of the smelter of the Majestic Copper Mining Company, at Milford, Utah, and has left for Needles, Cal., to erect a 40-stamp mill there.

Mr. Maurice Bell, of Redcar, England, grandson of Sir Lowthian Bell, president of the Bell Brothers, Limited, is in this country inspecting blast furnaces and steel works. Mr. Bell is accompanied by Mr. G. T. Jones, superintendent of the Clarence works, Middlesboro.

Mr. W. W. Case, president of the Denver Fire Clay Company, has purchased the interest of W. T. Cornwall, one of the founders of the company and for a long time its secretary, thereby securing the controlling interest. Mr. C. M. Woods has been appointed secretary to succeed Mr. Cornwall.

Mr. Henry W. Lamb has been appointed instructor in shopwork in Colorado College. He acted as Prof. Strieby's assistant at the college for many years, and carried on work for the public in assaying and chemical analysis. Later W. S. Stratton secured his services and sent him to Denver and Pueblo as agent in selling ore.

Messrs. W. A. Prichard and W. J. Loring are now general managers for the firm of Bewick, Moreing & Co., in West Australia. This means the supervision of a large group of valuable mines in different districts. Both of these American engineers are well known in California, and in the West, so that their success will be a matter of general interest.

OBITUARY.

Robert S. Jamison, Sr., president of the Jamison Coal and Coke Company, of Pennsylvania, died recently at Redlands, Cal., from pneumonia. He was born near Greensburg, Pa., 69 years ago. He owned a number of valuable farms in Westmoreland County, and was an extensive property owner in East Greensburg. For 29 years he was interested in the coal industry. He organized the Jamison Coal and Coke Company, operating 3 plants northeast of Greensburg. He is survived by a widow and 8 sons.

Franklin Ballou, for many years a prominent figure in Colorado mining and ore treatment, died of pneumonia, on March 20, at Palm Beach, Fla., whither he went from New York on March 1. Mr. Ballou moved from Pittsburg to Colorado in the early 70's, locating at Georgetown, where he was interested in mining and milling until 1879. He then moved to Leadville, where he mined and operated a sampling works for several years. In the early 80's he organized the Bi-Metallic Smelter at Leadville (practically the first successful demonstration of pyritic smelting in Colorado), the principal owner of which was David H. Moffat, Mr. Ballou acting as vice-president and general manager of the company. The Bi-Metallic Smelter, a few years ago, was absorbed by the American Smelting and Refining Company, and has not since been operated.

Mr. Ballou was recognized as one of the leading metallurgists of Colorado. At one time he was credited with purchasing and handling about one-eighth of the ore output of the State. He was highly respected by miners and his associates in the business world for his strict integrity. His retirement from active business in Leadville, on the sale of the Bi-Metallic Smelter, was much regretted. Mr. Ballou is said to have accumulated a comfortable fortune. He leaves a widow, a daughter and two sons, Franklin Ballou, a mining engineer, of Leadville, and Norris Ballou, a student at Yale.

SOCIETIES AND TECHNICAL SCHOOLS.

UNIVERSITY OF MICHIGAN.—The engineering department now contains 600 students, and the enrollment is gaining faster than in any other department of the university.

PENNSYLVANIA STATE COLLEGE.—A statement issued by this collage at State College, Pa., says within about 18 months the course in Mines and Mining has been remodeled and arranged on the plan of a comprehensive elective system, allowing the students an opportunity to specialize along certain lines of work, like chemistry, drafting, metallurgy, geology or civil, electrical, mechanical or mining engineering. The change has proved satisfactory, and the attendance has more than doubled during the past year. The interest of the students has greatly increased, and a much higher grade of work has been done. The equipment has been added to, and if the department is properly supported its future success is assured.

ENGINEERS' CLUB OF PHILADELPHIA.—At the meeting on March 7, 64 members and visitors were present. Mr. H. B. Schermerhorn, in a paper on "The State of the Art in Patent Cases," defined the "state of the art" as the whole field covered by prior inventions in the improvement of any device. The Federal Statutes and the rules of the Patent Office provide that inventors shall take notice of the state of the art. To constitute a prior use the identical idea of means expressed in the present invention must have been reduced to practice and made available for immediate use. To constitute a prior publication the invention described in the publication must be identical in all respects with that whose novelty it contradicts. The invention thus described must also have been a complete and operative instrument, ready for immediate employment by the public. The publication must not only be intended for the public; it must also have been placed within its reach. To throw light on the state of the art, recourse is had to searches, and a complete search of this kind must show:

Whether, at any date more than two years prior to the date at which the present inventor applied for a patent, the invention (a) was known, used, in public use, or on sale in the United States; or (b) has been described in any printed publication, either in the United States or in any foreign country; or (c) has been patented in any foreign patent-granting country, and printed among the published patents of that country; or (d) has been patented in the United States.

There is a prevalent impression that an application is subjected to so thorough and exhaustive a scrutiny in its passage through the United States Patent Office, that its final grant and issue amount to a guarantee of its novelty, and that the patent is thereafter safe from attack. In granting a patent what the office really does is to say, in effect: "In our opinion, such prior patents as already exist along this line constitute no anticipation of your invention. This conclusion has been reached by a more or less qualified expert in this class of apparatus or devices, aided by a carefully classified list of all prior United States patents bearing upon the subject. But we do not and cannot guarantee you the correctness of our conclusion." It is often said that a patent is not a truly valuable, marketable commodity until it has passed the ordeal of an infringement suit. In such a suit the burden and expense of proving anticipation lie upon the infringer, and the more useful or meritorious an invention, the more do the courts incline in its favor when it is thus attacked, and the stricter the proof they require of clear anticipation.

The paper was discussed by Mr. Carl Hering, Prof. Richards, Dr. Henry Leffmann, Mr. James Christie and others.

Messrs. J. T. Campbell, E. Collins, Jr., J. Harvey Gillingham, T. Chalkley Hatton, William H. Lindsey, W. L. Plack, Henry Hodge Quimby and H. F. Sanville were elected to active, A. P. Hume to junior, and John Nazel and C. P. Weaver to associate membership.

INDUSTRIAL NOTES.

The George B. Sannett Company, of Youngstown, O., has a new rock drill about ready to place on the market.

The Salt Lake Hardware Company has filled an order for a 60-h.p. boiler for the Emerald Mining Company, of Tintic, Utah.

C. H. Alexander, the Montana representative of the General Electric Company, has moved his headquarters from Butte to Helena.

The Salt Lake, Utah, branch office of the Allis-Chalmers Company, H. V. Croll, manager, has been moved from the Dooly Block to 209-211 Southwest Temple Street.

The Salt Lake branch of Crane Company has furnished a large amount of pie and pipe fittings for the plant, on Jordan River, being installed by the Utah Light and Power Company.

The Mine and Smelter Supply Company, of Salt Lake, Utah, has filled an order for the Yankee Consolidated Mining Company for a large air compressor plant of the Laidlaw-Dunn-Gordon type.

The Virginia Iron, Coal and Coke Company recently sold its iron furnace at Buena Vista, Va., to the Alleghany Ore and Iron Company, and has leased its furnaces at Johnson City, Tenn., and Graham, Va.

The Morgan Construction Company, of Worcester, Mass., recently closed a contract for a 16-in. con-

tinuous billet mill and a continuous rod mill plant for the Dominion Iron and Steel Company, of Sydney, N. S.

The Centennial-Eureka Mining Company, of Tintic, Utah, has placed an order with the General Electric Company, of Schenectady, N. Y., through its Salt Lake house, for an electric lighting plant for its Eureka mine and mill.

The Atlantic Dynamite Company, of Wilmington, Del., will erect a $1,000,000 plant at Nash, near Ashland, Wis., for manufacturing explosives for the copper and iron mines of the Lake Superior District. A tract of 2,000 acres of land has been purchased.

The Buckhorn Portland Cement Company will reopen its works at Rowlesburg, W. Va. Richard L. Humphrey, of Philadelphia, has been appointed general manager. The plant has been idle over a year through financial and legal difficulties. It cost the stockholders $600,000.

The Harrisburg Foundry and Machine Works, of Harrisburg, Pa., has secured an order for 3 1,000-h.p. engines for the Consolidated Electric Railways, of Huntingdon, W. Va., and has taken orders for 2 175-h.p. engines for the plant of the American Structural Steel Company at Pittsburg.

The contract for erecting the plant of the International Steam Pump Company, at Harrison, N. J., has been awarded, including machine shop, erecting shop, office, main foundry buildings, pattern shop and other buildings. It is expected that part of the plant will be in operation this fall.

The American Locomotive Company has secured a contract from the Mexican Central Railway for 25 simple consolidation locomotives, 8 simple moguls and 2 simple 6-wheel switching engines. The Sydney & Louisberg Railway, Sydney, N. S., has ordered 2 simple double-end consolidation locomotives.

The Pacific Jupiter Steel Company has purchased as a site for a factory 20 acres of land in South San Francisco, and will erect a steel casting plant. Work has started on the main buildings. The company expects to take 50 tons daily, and to supply mines, street railroads, etc., with steel casting. William A. Ruth is superintendent.

S. G. Murray, manager of the Salt Lake, Utah, branch of the Ingersoll-Sergeant Company, has made arrangements with J. E. Galigher, manager of the Utah Mining Machinery and Supply Company, whereby the Utah company will act as selling agent for the drill company, which will give up its office on West Temple Street, Salt Lake.

The New Jersey Cement Company, of Stewartsville, N. J., recently incorporated at Trenton, with a capital of $1,600,000, has Scranton and Philadelphia men interested. Morris Foust, of Belvidere, N. J., is president; Dr. Cummings, of Belvidere, secretary, and A. H. Bigelow, of Stewartsville, manager. Work on the new plant will begin shortly.

At the annual meeting of the Sloss-Sheffield Steel and Iron Company, held in New York City, the report of President Maben showed great increases in the production of iron ore, coal, coke, limestone and pig iron. Mr. J. W. McQueen was elected second vice-president and secretary-treasurer of the company. Mr. J. C. Maben continues as president.

The Otis Elevator Company, of New York City, has been awarded a contract for 18 electric elevators equipped with the push-button system of control—the largest number of elevators of this type ever included in a single contract. The Franklin Institute recently awarded the John Scott legacy medal and premium to this company for perfecting this type of elevator.

H. Clay Moore, Empire Building, Atlanta, Ga., has been appointed sole agent for the southeastern part of the United States, for the Scaife and We-Fu-Go Systems of water softening and purification, manufactured only by the William B. Scaife & Sons Company, of Pittsburg, Pa. Mr. Moore is known throughout the South in manufacturing and engineering circles, having had many years of experience.

The American Refractories Company, the new fire brick and clay manufacturing combine, will be capitalized at $15,000,000. The Colonial Trust Company, of Pittsburg, Pa., is financing the concern. The company has held options on about 38 independent concerns. It is said that the new corporation will have a bond issue of $400,000 in addition to its capital stock. The company will own in fee simple all of the properties to be merged.

The Dunbar Furnace Company, of Dunbar, Pa., has installed silica rock crushing capacity that will produce 800 tons of silica sand per day, one of the largest plants of its kind in the country. The sand is for use in open-hearth steel furnaces, steel casting plants, locomotives, air furnaces in malleable iron works, rolling mills, fire brick works, and for cores for iron and steel castings. The company's offices are at Pittsburg and Philadelphia, Pa.

The Consolidated Canal Company, of Mesa, Ariz., is arranging to furnish water for a large area, and is installing in its power plant the following apparatus recently purchased from the Westinghouse Electric and Manufacturing Company: A 300-kw. 3-phase revolving-field alternator, running at 400 revolutions per minute, and 11,000 volts, direct coupled to a waterwheel; also 3 50-h.p. type C motors of 200 volts, 7,200 alternations, and 850 revolutions per minute, to be used in operating irrigation pumps. All of this machinery has been shipped and is now being installed.

The A. Leschen & Sons Rope Company, of St. Louis, Mo., has opened an office and warehouse at Denver, Colo., where it will carry a full stock of various grades of wire rope, manila rope, etc. This gives the company branch offices and warehouses at 92 Center Street, New York City; 137 East Lake Street, Chicago, Ill.; 85 Fremont Street, San Francisco, Cal., and 1717-1723 Arapahoe Street, Denver, Colo. The company states that it is the sole manufacturer of the Hercules colored strand wire rope, and of patent flattened strand wire rope. It also manufactures tramways which load and unload automatically, likewise several types of friction grip tramways, and also single line and two-bucket tramways.

Engine sales for February, made by the Allis-Chalmers Company, include these: Bucyrus Company, South Milwaukee, Wis., one 16 by 42 1890 frame Reynolds Corliss engine; Southwestern Missouri Electric Railway Company, Webb City, Mo., one 30 and 60 by 48 horizontal cross-compound direct-connected Reynolds Corliss engine; Vulcan Iron Works, San Francisco, one 14 by 36 Reynolds Corliss engine; S. Obermayer Company, Cincinnati, O., one 20 by 48 Reynolds Corliss engine; Louisville Railway Company, Louisville, Ky., two 40 and 78 by 60 vertical cross-compound direct-connected Reynolds Corliss engines; Denver Engineering Works, Denver, Colo., 2 single differential electric driven Riedler pumps.

At the recent annual meeting of the Lackawanna Steel Company at West Seneca, N. Y., these directors were elected: J. G. McCullough, Governor of Vermont; Henry Walters, Baltimore; Warren Delano, Jr., New York; D. C. Blair, New York; John J. Albright, Buffalo; James Spire, New York; H. A. C. Taylor, Newport; H. McK. Twombly, New York; Cornelius Vanderbilt, New York; William E. Dodge, New York; Adrian Iselin, Jr., New York; B. S. Guinness, New York; B. H. Buckingham, Lebanon, Pa.; D. O. Mills, New York; Samuel Mather, Cleveland; Edmund Hayes, Buffalo; Walter Scranton, New York; Moses Taylor, New York; M. T. Pyne, New York; G. R. Fearing, Boston, and Robert B. Van Cortland, New York.

The Manufacturers' Light and Heat Company, now being formed out of the various companies owned or controlled by the Manufacturers' Light and Heat Company, will have a capital stock of $25,000,000, and will be the largest natural gas company in the world. The Manufacturers' Company absorbed the Fort Pitt Gas Company, of Pittsburg, and the present stockholders of the Manufacturers' Light and Heat Company have thus taken over the holdings of the Tri-State Gas Company, the Wheeling Natural Gas Company, the Fort Pitt Gas Company, the Wetzel Natural Gas Company, the Mutual Natural Gas Company, the Waynesburg Natural Gas Company, the Citizens' Natural Gas Company and the Canonsburg Gas Company. H. B. Beatty will be president of the new company, with general offices in Pittsburg.

TRADE CATALOGUES.

The Ohio Brass Company, of Mansfield, O., has issued a neat little pamphlet descriptive of its electric railway motor bearings, made of genuine bell-metal. The company also makes babbitted motor bearings of genuine battitt metal and bell-metal bearings are carefully machined to size.

Steel rolling doors, shutters, partitions for warehouses, shops, factories and buildings, where fire protection and convenience are desired, are described in an illustrated pamphlet sent out by the Columbia Steel Rolling Shutter Company, of Columbia, Mo. The shutters are particularly recommended for use in freight warehouses for their durability, ease of operation and small space occupied.

Salamanderite, a new fireproof paneling to take the place of wood for interior decorative effects, is described in a little pamphlet sent out by the H. W. Johns-Manville Company, of New York City. The material can be finished in exact imitation of oak, mahogany, maple or any fancy cabinet wood, either plain or with raised designs, and is said to be absolutely fireproof and impervious to moisture.

The Heisler Pumping Engine Company, of Erie, Pa., makes a specialty of high-duty pumps for water works and large mills and power-plants, and also makes boiler-feed pumps. Catalogue No. 3, just issued, calls especial attention to the valve mechanism employed in these pumps, by which it is claimed the same economy is obtained in a high duty pump as with a flywheel pumping engine of the same capacity working under like conditions.

General Catalogue No. 20 has been sent out by A. T. Ames, of Gault, Cal. This catalogue describes the Fulton pump. The pump has a variable motion due to the shape of the cog-wheels operating the plungers, and is stated to work smoothly and uniformly without water-hammer. The working head may be driven by belting or geared to an electric motor. It is made in sizes up to 8 in. discharge for mining and irrigation. One of these pumps, in use at the Tesla Coal Mine, has given an efficiency of 84.8 per cent.

An illustrated pamphlet of 52 pages published by the De Laval Steam Turbine Company, of New York City, contains a discussion of the application of steam as a motor and describes in detail the construction of the De Laval steam turbine. The advantages claimed for this device are: No losses by breakage through wear, small friction losses, high efficiency, simplicity of construction, ease of erection and small space required. The turbine may be direct-connected to an electric generator, to a blower or to a centrifugal pump.

The Western Electrical Supply Company, of St. Louis, Mo., has issued its general supply Catalogue No. 50, in which the company has endeavored with much success to illustrate its line of general supplies, construction specialties, tools, etc. The catalogue is a decided improvement on the last issued by the company in that while containing less pages it lists about twice the amount of material. The company states that it has got out probably the largest edition ever issued of such a catalogue, and is desirous of getting copies into the hands of everybody interested in electricity, and therefore will send a copy to any applicant. The catalogue is well bound and printed.

Electric hoists for Manila or wire rope are described in Catalogue 0225, a 16-page pamphlet published by the C. W. Hunt Company, of West New Brighton, N. Y. The pamphlet points out the advantages of electric hoists over steam hoists both in convenience of installation and in economy of operation, and mentions the saving of power lost by condensation of steam in long pipes or by friction at bearings in case shafting is used. The company claims for its electric hoists minimum cost of installation, durability and economy, and states that they are dust and water proof. The motors used range from 5 to 200 h.p., and the drums for wire or Manila rope are from 12 to 60 ins. in diameter. The speed of hoisting may be roughly divided into slow speed, 50 to 100 ft. per minute, for quarry and excavation work and traveling cranes; medium, 150 to 300 ft. per minute, for wharf and cargo hoisting and rapid, 400 ft. per minute, for mining or other work. Numerous illustrations show the general constructions of the hoists, the engineering details of which are briefly described.

SPECIAL CORRESPONDENCE

Denver. March 21.

(*From Our Special Correspondent.*)

While the militia has been withdrawn from Colorado City and the preservation of the peace is in the hands of the sheriff, open questions between capital and labor still exist, which threaten depreciation in industrial resources, with resulting suffering and losses by commercial and industrial interests.

Governor Peabody has appointed an advisory board to investigate the matters remaining open, and to make a full and detailed report to him. This board, whose ability is not doubted, consists of Prof. William F. Slocum, president of Colorado College, Colorado Springs; Charles D. Hayt, Denver, former Justice of the State Supreme Court; Rev. Thomas A. Uzzell, member of the Board of Supervisors of the Denver City Council; Frank W. Frewen, Cripple Creek, member of the present Colorado Legislature and a labor leader; Father Joseph P. Carrigan, a leading priest of Denver.

There is no provision in the statutes of Colorado for compulsory arbitration, and the above board was merely apointed to get at the bottom of the difficulty. The board will hold public sessions for taking testimony in the Chamber of Commerce Building, Denver, and will probably visit Colorado City and Cripple Creek and possibly Idaho Springs.

Present conditions at Cripple Creek cannot long continue. The chlorination mills at Colorado City and Florence of the United States Reduction and Refining Company, declared unfair by the unions, were the principal market for Cripple Creek ores running under 1½ or 2 oz. gold per ton. The smelters of the American Smelting and Refining Company at Denver and Pueblo, and the Boston & Colorado Smelting Company, at Denver, handle higher grades. Some of the mines may have ore high enough to ship to the Denver and Pueblo smelters, but most have not, and these low-grade mines can only ship to the chlorination mills of the United States Reduction and Refining Company. Other local mills

have more ore on hand than they can treat, and cannot accept ore from new customers. At Colorado City, the Portland Mill handles only the output of the Portland Mine, and the Telluride Mill, closed for alterations and additions, will not be able to receive ore for some time. If a settlement between the unions and the United States Reduction and Refining Company is not soon effected, the mine owners dependent on the mills of that company must soon close down. The United States Company's mills are said to have about two weeks' supply of ore on hand.

The Granite Mine, owned by the United States Reduction and Refining Company, is closed. Stratton's Independence, under contract to ship to the same company, is also closed, as is the Isabella, which also was under contract. Altogether 600 or 700 men are already out of employment by order of the unions.

Several mines, such as the Ajax, Elkton, Strong, Gold King, etc., which usually ship to the United States Reduction and Refining Company, are working, but are said to store their ore.

(BY TELEGRAPH.)

The strike situation at Cripple Creek continues unchanged. The Governor's advisory commission, which has been taking testimony at Denver, is at Colorado Springs, and leaves for Colorado City March 26. The Elkton Mine attempted to ship ore from the Standard Mill March 24, and the miners struck. The Gold King is also closed, and altogether about 1,000 men are out at Cripple Creek. The mines now closed are the Independence, Elkton, Granite, Thompson, Isabella, Golden Cycle, Gold King and Strong. At Colorado City everything is quiet. There are reports, not verified, that a settlement of the strike is in sight.

San Francisco. March 18.

(From Our Special Correspondent.)

Three miners, until recently employed at You Bet, Nevada County, were, a few days since, tarred and feathered while coming from a miners' meeting as the result of an article published in the Sacramento *Bee*, stating that hydraulic mining was illegally carried on around You Bet, and that Chinese were able to hydraulic while white men were not. The names of the mines working illicitly were given in the article with details as to operations. The matter is mentioned simply to show that there still remains in the mountain counties a strong feeling against the anti-debris laws.

Information is received in San Francisco that the United States Land Office and the United States Geological Survey will act in harmony the coming summer in the matter of investigating and determining the mineral character of lands in Placer, Plumas, Lasson, El Dorado, Shasta, Siskiyou, Trinity and Humboldt counties. Special agents will conduct the examination. This is an outcome of the differences between the miners and timber locators in the counties named.

The result of the examination will be practically to classify the lands, segregating those which are in well recognized mineral belts, something not now possible under the land laws. The California Miners' Association has been trying for years to have the lands on the railroad grants classified, but has been unable to get the Government to act in this direction. It will be a good thing for the counties named to have this classification made.

The Mountain Copper Company in Shasta County is not yet out of its strike troubles, though the men have gone back to work. There have been fights lately between the strikers and men coming in to take their places, and some of the deputy sheriffs have had to use force with the striking miners. It is highly probable in view of the difficulty with labor unions, with the Government, and private individuals, that the company will gradually draw out of business in California and try its fortunes in Mexico.

The Mine Inspector bill, about which so much has been said, has been finally "killed" by opposition in the Senate.

The sale of the Bagdad mines, near Ludlow, San Bernardino County, for a reported price of $1,500,000, should put considerable money in the pockets of a number of New York men who bought the property only a few years ago. Several of the owners have been in California the past few weeks after concluding the sale.

San Luis Potosi, Mex. March 17.

(From Our Special Correspondent.)

Interest in the gusher oil well at Guadalupe, a suburb of Mexico City, struck by Senor Luis de la Barra, on March 6, on the Hacienda de Aragon, continues great, and the Compania Exploradora de Anahuac, which had been drilling about a year before, is getting ready to resume work. A number of other companies are forming to drill in the neighborhood.

Coal seams have been opened at Presidio del Norte, Ojinango District, Chihuahua, and development has started on the Rancherias coal mines in Coahuila, and at El Puerte, near Saltillo. The Monterey Iron and Steel Company is contemplating erecting a plant for coking coal from its own mines at El Menos, to be used in the smelting furnaces at Monterey.

The Metallurgical Company, of Torreon, which, in February, voted to increase its capital stock from $2,500,000 to $3,000,000, principally to enlarge the plant at Torreon, has taken an option at $100,000, gold, on the American Mine, near Terrayas, of Messrs. Dale and MacDonald. The property was formerly held under bond by A. H. Burrage.

For Parral, Chihuahua, the Terranantes Consolidated Company has ordered a complete electrical equipment for hoists, pumps and all machinery, to be supplied from a central station, under the advice of Frank B. Rae, consulting engineer. Work will soon begin on the Caballo Prieto property, near Parral, which has been bonded to J. P. Hutchinson. In the Guerrera District of Chihuahua, the Venture Exploration Company, of London, is examining under the direction of John Hays Hammond the Dolores Mine, under an option of $2,000,000, gold. An organization of wealthy men has been formed in Chihuahua to work property known as the Colon Mines in the Yecora District, near the boundary line between Chihuahua and Sonora. Ore high in silver has been struck in the Cinco de Abril Mine, Chihuahua, which a short time ago was bought by A. F. Nathan, on what was believed by others a very poor showing, for the Kansas City, Mexico & Orient Railway. All along the line of this road denouncements are being made, especially in the Coyame District, where C. E. Delno, of Austin, Texas, has taken out a large zone for exploration. The country being opened up by this line has caused discussion about erecting a smelter in Chihuahua to start anew.

The new work in Sonora continues, and many Americans are going to that section prospecting. At Sierra de San Jose, Sonora, the Sultana and Napoleon Imperator mines are being developed by the San Jose Gold Treasure Company. The Tarasca Mining Company is making an excellent showing in the old mines near the Torres station of the Sonora Railway. The Bufa Mining and Milling Company, operating in the Sahuaripa District, is shipping high-grade ore and concentrates. The recent experiments of their metallurgist, Edwin M. Clark, with a leaching process, gave a product of over 80 per cent copper, and 2,000 oz. silver, practically a concentration of 10 to 1. This means a great saving in freight and treatment charges, and a plant is to be erected at once. The Yaqui Copper Company, with offices at 170 Broadway, New York City, operating at Campo Santo Nino, under the management of Charles Kaiser, will, as soon as the road is completed to Minas Prietas, begin improvements, reported to cost nearly $1,000,000, and the property bids fair to be one of the largest copper producers of Mexico.

At the salt mines of Sabinas, in Nuevo Leon, an American company, is putting in $70,000 for machinery, sinking a 100-meter shaft, and pumping the brine with the expectation of finding rock salt. It is believed that this work can be done at a good profit, for the mines have been paying well for years from the product of a burro-power well and hand-made evaporators.

W. J. Cartan, of New York, who has been in Mexico City and Oaxaca for six weeks, has just bought the Escuadra group of mines (Escuadra, San Jose, and Prolongacion de la Escuadra) in Oaxaca, from Juan Baites for the Eastern people whom he represents.

The mining stock market continues quiet, but the majority of the stocks have recovered from the dullness of several weeks past. The Monterey Iron and Steel Company went to $129; Dos Estrellas, $1,950; Cuico Sonores, $250; Santa Maria de la Paz, $780; Santa Gertrudis, Pachuca, $81; El Barreno, San Luis Potosi, $56; and Guadalupe, San Luis Potosi, $78.

Medellen, Colombia. Feb. 18.

(From Our Special Correspondent.)

In this State of Antioquia, the climate is generally healthful. There are two dry and two rainy periods alternating at intervals of three months. In this city records kept by the American consul for 5 years show the extremes of temperature to be 55° and 85° F. There are splendid streams of water for power, one large river, having a perpendicular fall of over 900 ft.

Along almost the entire length of the Porce, Nechi and Cauca rivers, are rich alluvial mines. The methods usually employed by natives are crude, but often very profitable. The mines near Zea on the Porce River, which can only be worked during the dryest season, will produce this January and February, it is claimed, 400 oz. of gold, obtained by washing with long-handled bateas and by diving.

Several American companies are bringing in machinery, a large amount being in Barranguilla awaiting shipment up the Magdalena River. A company from Kansas City, Mo., under the management of John T. O'Brien, has installed on the La Clara Mines on the Porce an Evans hydraulic elevator. A recent clean-up of a 30-day run from this gave nearly $10,000. Just below and across on the same river the Consolidated Mines Company, of Boston, under the management of Charles Fox, has a similar plant ready.

Quartz is found everywhere, but seldom worked, except when quite free milling. The Zaucudo mines, entirely under native management, employ nearly 2,000 people. Here the base ores are smelted on the ground. The lead is imported from England, while good coking coal is brought by bucket tram, only a short distance. The product is now about $20,000 in bullion per month. Before the war, under the management of Juan de la Posado, a native of Colombia and a graduate of the University of California, the company shipped monthly $35,000. It uses 1,200 tons of coal and 15 tons of lead per month. Near Remedios some 20 miles back from the Porce River several foreign companies are working. The most important is the Frontino & Bolivia Gold Mining Company, of London. It has a very extensive property, the principal mines being the Salada and the Silencio, the latter over 700 ft. deep on the dip, but now flooded on account of lack of pumps. The company operates 3 California mills and several native wooden mills. The new manager, Alfred Tieey, is preparing plans for a water power plant to generate 500 h.p. to be transmitted about 6 miles. At present less than 1,000 people are employed. The Sucre Mine, an English Company, under the management of Ed Halse, is working in a small way, but is very short of labor. North of Remedios are the important Leristales and San Nicolas mines. They have a fine 35-stamp California Mill, but are just starting, after being closed during the recent revolution, and only 5 stamps are dropping. Three miles south of Remedios, the Colombian Mines Company, a Chicago concern, has recently started work on the Venecia Mine, and is opening a very promising ledge. It has a 24-stamp native mill, but has a California mill bought in the States ready for shipment.

There is a great scarcity of labor in all the mining districts of Antioquia, especially near Remedios. Near Amalfi and Anori are located many mines, the majority of which closed down during the revolution, and have not been reopened. Near the main road, between Anori and Amalfi, overlooking the Porce River, is the Salvadora Mine, owned by New York parties, under the management of Luis G. Johnson. It has a small mill, and is being systematically developed, and produces rich ore; the monthly clean-up of the battery boxes, sometimes showing nuggets worth up to $50. The Bramadora is another mine of promise being developed near the Porce. It has a very large vein, and arrangements are reported being made to erect an 80-stamp California mill. It is a concentrating proposition, the product being shipped to England.

London. March 14.

(From Our Special Correspondent.)

After much agitation the shareholders and creditors of the London & Globe Corporation have succeeded in obtaining a criminal prosecution of Mr. Whitaker Wright for the fradulent statements in balance sheets of the company. It will be remembered that the law officers of the Crown decided that it was not a case for the public prosecutor, but recommended that shareholders should undertake a prosecution on their own responsibility. A committee obtained some promises of funds for the action, but not sufficient to warrant a start being made. It was therefore decided to apply to the High Court for permission to be given to the official liquidator to use the assets of the company in paying for the litigation. The motion was made before Mr. Justice Buckley, who is an authority on company law, and he decided to give power to use the assets in this way, provided the money already privately subscribed was paid up into court and utilized as far as it would go before the assets were drawn on. The judge gave a very complete statement of the reasons which led him to this decision. He said that many grave irregularities had been allowed to pass without action being taken, owing to the disinclination of shareholders to undertake the expenses of a prosecution after having lost all their money; that no such prosecutions should be allowed just for the sake of wreaking private vengeance, but only for the good of the community. A few prosecutions under the company law would be of service in preventing promoters from being reckless in the future. Under these considerations he deemed it right to facilitate the undertaking of this particular case. We have, of course, not heard the whole facts on which the shareholders base their action, nor have we heard the defendant's arguments on his side. Neither do we know whether, if the offenses are proved, the law is long enough to obtain a conviction. It is satisfactory, however, to know that the case is to be thrashed out completely.

A good deal has been heard during the last few

weeks in speculative circles concerning the forthcoming Caucasus Copper Company, Limited. Mysterious paragraphs appear in the papers, and tips are circulated on the Stock Exchange to buy the £1 shares at £2½. So far no prospectus has been issued, nor has any report on the property been published. The company, however, is very strongly supported, and the shares are all underwritten or taken up by influential people. The Venture Corporation (of Stratton's and Camp Bird fame) is the moving spirit and manager of the flotation. The capital is £500,000 in £1 shares. The properties acquired are the Dzansul Copper Mines, situated at Dzansul, 40 miles from Batum, in the Caucasus. They have been considerably developed, and according to Mr. Stanley James, the English mining engineer who has examined them, there is a large amount of ore blocked out. The total amount of "ore in sight" is given as approximately 2,000,000 tons, averaging, say 3½ per cent of copper. I am not able to give a definite statement of the gold and silver contents, but believe them to be comparatively unimportant. A smelting plant was completed in November last, capable of producing 60 tons of copper a week, and the capacity is now being doubled. An important point to remember is that there is a heavy duty of £24 per ton on copper imported into Russia, so that if the product of the smelter is sold within the Russian empire the price obtained will be far greater than if it were brought to the London market. The company is being capably managed, and it will shortly take a leading position among London copper companies.

In several of my recent letters I have mentioned that the speculators are trying to work up a boom in Egyptian mining and exploration companies. The absence of business in South Africans and West Australians, and the collapse of West Africans, has rendered it necessary that something should be done to bring the mining market back to life. The progress of the Egyptian boom has been very marked during the last week, and there is already an Egyptian section on the floor of the Stock Exchange. The existing companies are all publishing interviews with their directors or mining engineers in the financial papers, and many promoters are forming new companies to acquire what they can. I have already heard of one subsidiary company formed that staked out its concessions on the map instead of on the ground, and no doubt there are many more such. One of the anomalies of the Egyptian mining market is that companies are not allowed, by the terms of the concession, to appeal to the public for support. The original idea of the Egyptian rulers was that they did not want the country exploited by the company promoter. There are only a few concessionaires, each holding large territories, and negotiations for the acquirement of mines or prospects have to be made with these companies, and not with the Government or local landholders. The promoter, not being allowed to appeal to the public by means of a prospectus, issues vendors' shares, and has the others underwritten, and the many evils of the non-issue of prospectuses are at once seen. Probably some of the leading companies will petition the Egyptian Government for permission to issue prospectuses, and it is to be hoped that, in the interests of both the English investor and the territories themselves, such a petition will receive serious consideration.

Johannesburg, Transvaal. Feb. 24.

(*From Our Special Correspondent.*)

Great hopes were placed on Mr. Chamberlain's efforts in Central Africa, to open up that field for the Rand, but after listening to his utterances on the subject it does not look a promising proposition. In his greatest speech, Mr. Chamberlain asked what government could do, in the matter of labor, and answered the question by saying "Nothing." Many old South Africans think this is a foolish answer, for they declare that the government can do a great deal by putting a heavy tax on all natives who will not work. A system much advocated is that known as the Glen Grey Act, which is, that natives who do nothing the whole year be taxed at least $60 per annum, and for every month they work $5 be taken off. If they work all the year no tax is demanded of them.

To the mining community the most satisfactory utterances of Mr. Chamberlain were those in which he expressed his views on the native question. He affirmed that as Great Britain had stopped the depopulation caused by inter-tribal war and slave raiders, the Kaffirs will increase tremendously in numbers, and unless in some way they can be settled in regular industry, they will create a danger and difficulty of the first class. Mr. Chamberlain sees that although slavery has been abolished in theory, it exists in another form in South Africa. The Kaffir buys his wives, and these women are no more than slaves, doing all the labor, while their master leads a life of useless idleness, but how to break up this system is a question that has baffled many a wise head.

The only practical suggestion Mr. Chamberlain made on the subject of Kaffir labor was that an intercolonial conference be called immediately to consider native administration and native legislature. There have been advocates of the scheme of importing Chinese laborers by the thousand, and many were curious to hear Mr. Chamberlain's utterances on the subject. He proved to be emphatically against the idea, and it is useless to look to China or India for labor, for many years to come.

Read between the lines, Mr. Chamberlain's speeches show that his pet idea is to substitute cheap white labor for black labor as much as possible. From his point of view, there is much to be said for the scheme. The more British laborers that can settle in the Transvaal the safer will the country be. There are thousands of laborers in England no doubt looking to this country as the Promised Land, and this part of the great British Empire would no doubt be greatly strengthened, could these eager settlers be placed on the mines, or on the land.

The opinion held by many that it would be impracticable to work cheap white labor in the same mine with Kaffirs, has proved erroneous. By placing gangs of white men to themselves work is carried on quite harmoniously. It is unwise to mix the two classes, for the whites show a natural aptitude for putting most of the work on to the Kaffirs. The belief that the white laborer would prove much more efficient than the Kaffir worker is now known to be false. Wild statements, such as that one white man would do as much as three or four Kaffirs, have been utterly disproved. As a mere muscular machine, a well-built, healthy Kaffir, thoroughly trained, is the equal of an ordinary white worker. Industrial training and greater brain power are the white man's advantages. Where mere brute force is required, the Kaffir, after a few months' training, is as good as a white man, and in the mines he is better, for he obeys his "boss" implicitly, is much easier to manage than a white man, and never goes on strike.

Heretofore a Kaffir as efficient as a white laborer only cost the company 50c., while the white unskilled worker costs nearly $2.50 per day. The maximum result obtained by the use of cheap white labor was that one white man did as much as two Kaffirs, while the minimum result was one white man did less than one Kaffir. From this it is seen what an expensive muscular machine a white man is compared with a Kaffir. If white labor were entirely substituted for black only a few of the richer mines could stand the strain. As it is, instead of the reduced costs per ton people prophesied would come about as soon as the Transvaal became British, the total cost per ton treated to-day, including the government tax, is over $1 higher than before the war. This is due to the small scale of working, and the partial substitution of black for white labor. The total average profit from all gold produced by Witwatersrand mines is $2.55 per ton. From this it is seen that the margin between working costs and dividends is not over large, and that the strictest economy must be used to make some of the mines pay dividends at all.

Sydney, N. S. W. Feb. 17.

(*From Our Special Correspondent.*)

Queensland.—The gold output for January was 41,456 oz. fine, an increase of 1,803 oz. over 1902. The dividends from the various fields amounted to £66,786, and the calls to £22,672. The Great Northern Freehold, the oldest and deepest tin mine at Herberton, has opened up a large face of coarse tin ore at the 500-ft. level. The Cuprite Tin Company, about 6 miles from Herberton, is also on rich tin. The new lode at the 750-ft. level of the Mount Morgan Mine has been penetrated for 130 to 140 ft. For 110 ft. the lode goes over 1 oz. of gold to the ton, but for the last 20 or 30 ft. lower-grade stone was cut, some being partly unpayable. It will average, however, from 7 to 8 dwt. A good find of gold has been discovered in Dawes Ranges, 60 miles from Gladstone, which dollies ¾ oz. to 3 oz. per ton. The ground has been pegged out for about 3 miles.

Victoria.—At Beechworth and Stanley all sluicing claims are at a standstill for want of water. Good gold still continues to be found by many parties at the Waanyarra rush, nuggets up to 15 oz. having lately been discovered. Each succeeding week for some weeks past the yield of the Berry Consols Extended, Creswick, has been steadily increasing.

Tasmania.—The total value of the minerals produced in Tasmania for 1902 is officially given as £1,518,960, being a decrease of £256,274, compared with 1901. The value of the minerals won during January, 1903, is £74,778; a decrease of £43,508, compared with January, 1902. The Volunteer Mine at Mathinna is opening up well at the 200-ft. level, at the north end of which the reef is 5 ft. wide, of good average stone. Negotiations between the directors of the Tasmanian Gold Mine, Beaconsfield, and the English Syndicate, which were reported to have resulted in the sale of the property, have fallen through, owing to legal difficulties. The Mount Lyell smelting returns, from January 8 to February 4, show 22,958 tons of ore treated, the average assay before treatment being 2.13 per cent copper, 2.11 oz. silver and 0.071 oz. gold. In addition there were treated 3,560 tons of purchased ore and metal-bearing fluxes. The Converters produced 456 tons of blister copper containing 451 tons copper, 45,044 oz. silver and 1,616 oz. gold. For over 2 months the furnaces have been running on ore containing less than 2¼ per cent copper, and it is not unlikely that economies in smelting will within a short time allow of a 2 per cent ore being treated without reducing present profits.

GENERAL MINING NEWS.

ALASKA.

(*From Our Special Correspondent.*)

News, via Dawson, concerning the strikes on the Tanana River would seem to confirm the value of the new diggings. Average values of gravel are given of 6c. per pan to 40c. Pay is also reported on the following creeks in the district: Gilmore, Gold Run, Twin, Cleary and Fish. Pay has been found at points 4 miles apart, and the beaches prospect well. Water and timber are reported abundant.

ARIZONA.

COCHISE COUNTY.

(*From Our Special Correspondent.*)

Calumet & Arizona.—At this mine a large amount of copper ore is reported blocked out. No. 2 stack will be running in April, and No. 3 will be completed during the summer. With one stack the company is reported making over 50,000 lbs. of copper daily.

Calumet & Bisbee.—The 3-compartment shaft has cut stringers of ore of good grade, according to reports.

Calumet & Cochise.—The Calumet, Mich., people interested in the Calumet & Bisbee have bought for $200,000 the block of claims lying southeast from the Calumet & Pittsburg, and are sinking a deep shaft.

Pittsburg & Duluth.—Messrs. Cole and Congdon, of Duluth, Minn., and Oliver, Tener and Snyder and others, of Pittsburg, Pa., have bought 18 whole and fractional claims adjoining the Calumet & Arizona and Lake Superior & Pittsburg companies' holdings, in both of which companies they are interested, and are sinking a shaft. The new company is capitalized for 50,000 $15 shares, which sum covers the purchase and costs of development.

MOHAVE COUNTY.

(*From Our Special Correspondent.*)

Golden Gem.—This mine owned by the C. O. D. Company, of Stockton Hill, has a shaft 326 ft. deep.

PIMA COUNTY.

(*From Our Special Correspondent.*)

Renard.—This mine, near Casa Grande, has a 30-ton smelter in operation, and 40 men at work. There are 20 claims in the group.

YAVAPAI COUNTY.

(*From Our Special Correspondent.*)

French Lily.—This mine, in the Bradshaw Mountains, is down 200 ft., and producing shipping ore.

CALIFORNIA.

AMADOR COUNTY.

Kennedy.—The concentrators are being put in at the new mill, near Jackson. J. F. Parks is superintendent. Electric power is to be used for the mill. Twenty stamps are to start in connection with the present hoist, as the new hoist, able to lift 1,000 tons every 24 hours, is not ready. According to report there will be 100 stamps at the new mill, doing away with the old 40-stamp mill at the old shafts.

Sargent.—Operations have ceased at this mine, and the men are laid off. The drifts did not show anything of importance beyond the usual Mother Lode formation.

BUTTE COUNTY.

Gardella.—The fine orange orchard on this tract, near Oroville, has been bonded for $3,000 per acre by Chicago men, who are to dredge the ground.

CALAVERAS COUNTY.

Continental.—The mill is running steadily at this mine, near West Point. D. W. Graves is superintendent.

Fannie-Marie Mining Company.—This company, at Glencoe, Charles H. Blake superintendent, has begun work on the old tunnel of the C. A. Berry Mine.

Fellowcraft Mining Company.—The case of F. J. Treat, Jr., against this company is on trial at San Andreas. The mine was relocated January 1, 1902, by J. F. Treat, Ben Johnson and H. Sewinge, who claimed that no annual assessment work had been done by the company the year before.

Reliance.—This mine, at West Point, J. McMahon, superintendent, has 3 tunnels which show ore. The ore is highly sulphuretted, and carries free gold.

INYO COUNTY.

Arondo Mining Company.—This company is operating near Argus, with G. L. Dean in charge. In

the last 100 ft. of sinking the values of the ores have increased.

KERN COUNTY.

Ajax Extension.—On Soledad Mountain, near Mohave, a body of ore has been found in this claim, owned by Gerner Brothers. The company is running tunnels.

Consolidated Mines Company.—This company, at Randsburg, Percy H. McMahon manager, owns 21 claims, some of which had previously been practically abandoned. Considerable work is now being done. W. E. DeGroot, of Los Angeles, is president, and T. S. Fulle secretary.

MARIPOSA COUNTY.

New Franklin Oil Refinery.—This refinery at Los Angeles, is reported as turning out about 5,000 bbls. of asphalt monthly, in addition to distillates.

Pacific Smelting Company.—This company has selected a site for its proposed Kern County Smelter, at Bakersfield. Sampling works will be put up both at Bakersfield and Caliente.

Pinon Blanco.—A strike of importance is reported in the Pinon Blanco Claim, near Coulterville. Wm. T. Stephens is superintendent.

Zada.—Specimens of ore, called sylvanite, on exhibition in Kern, are reported to have come from the Zada and some other mines about 30 miles from Caliente.

NEVADA COUNTY.

Murchie.—At this mine, near Nevada City, the water is being removed, and the old drifts retimbered. The 8-stamp mill is being overhauled.

Portland.—A suit is on at Grass Valley to determine title to this mine, near You Bet. The suit is brought by the Numitor Mining Company against T. J. Nolan and others. Assessment work was done on one of a group by the company, but not on all, and the defendent relocated the Portland.

Standard.—The shaft of this mine, at Grass Valley, now 150 ft. deep, is to go to 500 ft., and a 20-stamp mill may be erected. Boston men have recently become interested.

PLACER COUNTY.

Enterprise.—The Gilmore Brothers are prospecting this mine at Iowa Hill. The tunnel is in 400 ft.

Charronat & Lindley.—A tunnel has been started on this drift mine, near Westville. The mine is under bond to J. F. Littlefield, of San Francisco.

Powler & Gallagher.—These placer claims on the American River, near Colfax, are to be worked by a dredger under the supervision of F. B. Jackson, of Sacramento.

Shady Run.—Five stamps are to be added to the mill of this mine, near Blue Canyon. R. A. Watson is superintendent.

SACRAMENTO COUNTY.

(*From Our Special Correspondent.*)

Blue Ravine.—This mine, near Folsom, Sacramento County, owned by the Consolidated El Dorado Mining Company, C. C. Belding superintendent, has 60 men at work and is running a main drift some 1,100 ft. long, using air drills. The gravel is hoisted to the surface for washing.

Sacramento & Rescue Mining Company.—This company, recently incorporated, is working the Hale Place, near Folsom.

Twin Brothers Mining Company.—This company, near Folsom, J. M. Crowder manager, is opening its quartz mine. A tunnel has been run to connect with the shaft.

Woods Gold Mining Company and Hupp & Roberts Company.—These companies, above Folsom, are still prospecting for the gravel channel in their mines. Considerable water has to be handled.

SAN BERNARDINO COUNTY.

Bagdad.—These mines, at Camp Rochester, 8 miles from Mohave, have been sold by the Rochester, N. Y., owners to Los Angeles men for a reported price of $1,500,000. The Bagdad properties have been producing handsomely for some time. They were owned by Chauncey M. Depew, E. Van Etten, J. M. Beckley, B. E. Chase, J. H. Steadman, E. F. Brewster, F. P. Allen, T. J. Devine and Josiah Anstice. A branch railroad runs from Ludlow to Camp Rochester.

Brooklyn.—An important strike is reported in this mine at Dale, in the lower workings.

Hornspoon.—In this mine, near Victor, A. A. Moreno and A. Preciaco, have struck free gold quartz, some of it assaying very high. Prospectors in the neighborhood have been taking up many claims.

O. K.—Rich ore has been found in this mine at Dale on the 300 level.

SAN DIEGO COUNTY.

California State Mines Company.—This company has been incorporated, with principal place of business at Colorado Springs, Colo., to work the Free Coinage Mine in Deer Park District.

SANTA BARBARA COUNTY.

Machinery has been put in on the beach south of Casmalia, by Fred Erickson and others, to work the ocean beach black sands carrying fine gold.

SANTA CLARA COUNTY.

Santa Tercsa.—Contracts have been let for the construction of reduction furnaces of 40-ton capacity for this quicksilver mine. The mine was worked 25 years ago, and has lately been reopened by Boston men.

SHASTA COUNTY.

E. Holden, R. A. Martin, W. J. Masterson, W. A. Schroter, F. Lammon and E. Klaukens have located 48 copper claims in Hazel Creek District, near Sims, Shasta County.

(*From Our Special Correspondent.*)

Brunswick.—At this mine, near French Gulch, owned by Frank B. Rossi, a rich strike has been made.

Old Spanish.—This mine, in Lower Springs District, near Shasta, is to be reopened. It has a steam hoist and a 10-stamp mill.

SISKIYOU COUNTY.

(*From Our Special Correspondent.*)

The miners up in this county consider this the best water season they have had in years, and most of the mines are busy.

A. C. Brokaw.—Water has been turned into the big ditch at Quartz Valley, to supply water for this hydraulic mine.

Eastlick Brothers.—This hydraulic mine, near Oro Fino, is now worked on an extensive scale, with water to supply giants and elevator until late in summer.

Gardner-Eastlick Quigley.—A new hydraulic elevator is being built for this hydraulic mine at Oro Fino.

Deep Bank.—The flume destroyed by the storms at this mine, 13 miles from Cecilville, is shortly to be replaced. The mine has 3,000 in. of water under 350-ft. head, but is at present idle.

Helena Gold Mining Company.—Three tunnels are being driven with air drills on the property of this compan yat Callahans. James McKeen, the superintendent, expects to employ about 60 men the coming summer. The cyanide plant will handle between 60 and 70 tons of ore daily.

Jilson.—At this quartz mine, near Henley, 35 men are at work, and as soon as the mill is running 70 men will be employed.

Liberty District.—In this district, on Salmon River, near Rollin, the Yreka Mining and Milling Company, L. D. Ball superintendent, is the largest producer; among others are the Cordoza, Frazier, Ida May, Wilson Brothers, Peterson Brothers and Welker & Behnke. Governor John Daggett's old claims are being reopened by the Evening Star & Central Mining Company, which has purchased them.

Morrison & Carlock.—The hoisting works of this mine, near Fort Jones, W. E. Everson superintendent, have burned down. The gallows frame was 60 ft. high.

Summerville.—This hydraulic mine has been sold to the Salmon River Hydraulic Mining Company, which will use 3 7-in. giants against the gravel bank, the water being brought from the Salmon River. The claim is supposed to have already yielded about $500,000, and many acres of gravel remain.

Yellow Jacket.—This gravel claim, near Sawyers Bar, Ed. Harris superintendent, is running full time.

TRINITY COUNTY.

(*From Our Special Correspondent.*)

Beale & Temple.—This mine, at New River, has been purchased by James Cronin, of Spokane, Wash.

La Grange.—This hydraulic mine, at Weaverville, P. Bouery general manager, has been running under the supervision of Foreman Frank Perenin in the manager's absence. A handsome clean-up was recently made.

Lappin.—This mine, at Deadwood, recently bonded by the J. J. Chambers Company, of Redding, is to be equipped with modern machinery.

Quincy.—At this mine, near New River, a 20-stamp mill is to be erected.

TULARE COUNTY.

(*From Our Special Correspondent.*)

A deposit of mica on George Simmon's land, 6 miles west of Hot Springs, has been bonded by Michael Mitchell, of White River, and W. A. McKinley, of San Francisco, who are getting out a car-load for shipment.

TUOLUMNE COUNTY.

(*From Our Special Correspondent.*)

The mines at Groveland and Big Oak Flat will shortly be supplied with electric power.

Altadena.—At this mine, near Columbia, C. A. Holland manager, about 20 men are busy. The mine is owned by the Altadena Mining and Investment Company, of which J. J. Smith, of Oakland, is secretary.

Blue Bell.—This mine has been bonded by its owner, Mrs. D. Pennington, and work will soon start.

Campo Seco Mining Company.—This company, at Jamestown, has bought 240 acres of mineral lands on the Campo Seco flats. The land was worked by open cuts and pits in early days, and surface ground washed in rockers and toms. The new company is sinking a 3-compartment shaft. The property is supposed to be a big low-grade proposition.

Cornucopia.—At this mine, near Soulsbyville, 10 men are cross-cutting from shaft bottom to cut the ledge of the Black Oak Mine.

Densmore.—At this mine, near Columbia, there are 50 men at work and a 10-stamp mill and 2 2-stamp batteries are busy.

Horseshoe Bend Mining Company.—This company, of Boston, Mass., has bought through its agent, W. S. Heath, the Doyle property, which divided the company's different claims near the Stanislus River.

Hypo.—This mine, near Columbia, is reported to have yielded $20,000 in the past 2 weeks from a quartz pocket.

Jumper.—The 500-ft. level from the main shaft at Stent, Mark B. Kerr manager, is within 200 ft. of connecting with the Golden Rule claim, the ore from which will go along the 500 level to the Jumper main shaft. All the men recently laid off at the Jumper, owing to caves, will be put on again soon.

Longfellow.—This mine at Big Oak Flat, is to have a 30-stamp mill. The mine is opened to a depth of 543 ft.

Mazeppa.—At this mine, near Stent, Henry Moore superintendent, 10 stamps are to be added, and new concentrators put in.

Mountain Bell.—This mine is to have a larger hoist.

Shoenberg.—This mine, 4 miles from Groveland, owned by L. D. Shoenberg, and under the management of M. C. Dale, is having a good deal of development done upon it.

YUBA COUNTY.

(*From Our Special Correspondent.*)

O'Brien.—A dredger is to be put on this mine, 9 miles east of Marysville.

COLORADO.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

Another increase in iron production is reported, while the advance in spelter is increasing the zinc tonnage. There have been several important new strikes.

Leadville Zinc Production.—This has run up to over 250 tons a day. About half of the output goes to the Cherokee-Lanyon Zinc Company.

A. M. W. Mining Company.—About 200 tons a day is the output handled by the mills. A large amount of new prospecting and development is going on.

Alicante.—Litigation has ended that greatly delayed work, and the promising outlook for zinc will prove an important factor in future operations at this locality.

American Smelting and Refining Company.—A heavy tonnage is being received at the Arkansas Valley plant and another furnace has blown in, making 7 lead furnaces and 1 matte furnace in operation handling daily of 850 to 90 0tons of ore. The new mill for handling low-grade sulphides is handling 200 tons daily.

Caribou.—In addition to the 200 tons daily of good iron shipped, a fine lead ore is being mined.

Cloud City Mining Company.—The old drifts at the 500-ft. level are being cleaned out preparatory to making regular shipments from the manganiferous body disclosed.

Evalyn.—A sulphide body is being developed at the 1,000-ft. level, and 300 tons a month are taken out, while prospecting goes on. The shaft will be sunk deeper to get under the ore. A heavy water flow will be handled below the 1,000 ft.

Horseshoe and Ulster.—Newton territory is to be developed. Reynolds & Hanifen are the owners.

Little Bob.—A drift is being run to open the ore recently encountered.

Louisville Group.—About 30 tons a day of zinciferous ore is coming from the Colorado No. 2 shaft, above the water level.

Maple Street Mining Company.—This downtown proposition is in virgin territory, but will require heavy pumps. A company is being organized, and London parties are to be interested.

New Leadville Home Mining Company.—Following up the big iron body encountered in the workings south of the Penrose shaft, a 3-ft. streak is

cut that averages $600 to the ton in silver and lead values. It is similar to the bonanza finds of the early days, and can be traced some distance. The company is sacking this rich material and shipping 200 tons daily of good iron.

New Zinc Mill.—Arrangements are on foot to change the old cyanide mill erected by the Ibex people below Leadville into a first-class zinc concentrating mill. D. B. Rowe, of Kansas City, one of the operators of a lease on the Yak territory, is said to be interested. W. W. Davis, of the Yak Company, is looking after the project.

Nisi Prius.—New lessees headed by Maurice Stearn are shipping 40 tons daily of good grade iron.

Sharpe Gold Mining Company.—Three shafts down from 40 to 80 ft. indicate good mineralization and a new shaft is started on the Daisy-Laura.

Sixth Street Shaft.—Local lessees have begun opening new ground at the 600-ft. level. Shipments of manganese ore are 50 tons daily to the steel works at Pueblo.

St. Louis.—This property has been idle during the winter, but will shortly resume under lease and develop known ore bodies through its tunnel.

Two Bit Mining Company.—Sinking is resumed on the Two Bit shaft to give a total depth of 400 ft., enabling the ore found at 325 ft. to be mined to better advantage.

Valentine Mining Company.—In the drifts at 500 ft. the showing is very good. The drifts are to be run 150 ft. more, and a drill hole sunk. Several upraises are being run in good carbonate contact. The flow of water handled is 750 gal. a minute.

OURAY COUNTY.

Ouray Chief Mining Company.—This company having property about 2 miles east of Ouray, has purchased the Fowler Smelter, near Ouray, and will put it in condition to treat the company's ore, as well as to do custom work. David Woods will be manager. The plant was built in 1897 by Mr. Fowler and other Chicago men, but was closed after about 2 years by litigation.

TELLER COUNTY—CRIPPLE CREEK.

Golden Cycle Mining Company.—A telegram from William P. Bonbright & Co. says that an extra dividend of 3½c. was declared by the Golden Cycle directors on March 21, making a total of 5c., payable March 25. This will cut the treasury reserve to about $30,000, but President Milliken claims there is ore broken in the mine at present amounting to $150,000, which can be marketed immediately the mine resumes operations.

(*From Our Special Correspondent.*)

Acacia Gold Mining Company.—This company has declared a dividend of 1c. a share, payable April 1. This dividend is the fourth dividend paid by the company. The money was derived from the royalties received from lessees.

Bull Hill Consolidated Mining Company.—H. G. Lunt and O. B. Wilcox, trustees for this company, have conveyed the Horseshoe, Londonderry, Fairview, High Tide and Bertha mining claims to the United Mines Company. The claims are favorably located on Bull Hill, and are considered to be very valuable. The consideration cannot be learned.

Cripple Creek Enterprise Gold Mining Company.—It is reported that this company, now operating under the streets of Cripple Creek, has a very promising outlook, and has decided to install heavier machinery, consisting of 2 80-h.p. boilers, a new hoist, good for a depth of 1,000 ft., and an air compressor.

Golden Cycle Mining Company.—At a recent meeting the directors decided to purchase from John T. Milliken, president of this company, 10 acres of ground adjacent to the company's property. The claims consist of the Aluminum, Fedora and Lone Star, lying just west of the Golden Cycle. They formerly belonged to the Gold Knob Mining and Townsite Company, and were purchased by Mr. Milliken some time ago for $27,250. It is reported that the company intends to develop this territory.

Isabella Gold Mining Company.—Babbit and Murphy, leasing on the Buena Vista claim, have installed a hoisting plant on the incline of the Duena Vista, and will use a skip. They have obtained an extension of their lease.

Mars Consolidated Mining Company.—At the annual meeting directors and officers were elected. The directors chosen are: H. L. Shepard, J. C. Statts, J. E. Jones, F. L. Ballard and W. F. Rock. H. L. Shepard was chosen president, J. C. Statts vice-president, and J. E. Jones secretary and treasurer. This company owns 13 acres of ground adjoining the Abe Lincoln of the Stratton's Cripple Creek Development Company.

Sioux Falls & Cripple Creek Mining Company.—This company is driving the Fort Wilcox tunnel into Copper Mountain, in the northern part of the Cripple Creek District, with machine drills. It is in about 1,000 ft., and has cut the Flourine vein, where so much rich ore was taken out a few years ago. This company intends to erect a cyanide mill at the mouth of the tunnel to treat the low-grade ore exposed.

Stratton's Independence, Limited.—This company has stopped work at the fine. The miners struck because the mine ships to the Standard Mill at Colorado City, which has been declared unfair.

Besides the Stratton's Independence the Isabella Gold Mining Company, the Granite Gold Mining Company, the Tompson and the Elkton Dump lease have shut down. The Ajax Gold Mining Company has quit breaking ore, and is only doing development, as is the Strong Gold Mining Company and the Gold King Mining Company. What ore is mined is stored and not shipped, owing to the labor troubles. There are about 718 men now idle in the district.

Valley City Leasing Company.—This company has a bond and lease on the Shurtloff claim on Bull Hill. Reports indicate it has a good lease, as the mine is now down 1,000, and a station is to be cut to develop the vein that has been opened. It is stated that the company intends to take up its bond as soon as a lawsuit over the claim is settled. The bond is for $150,000.

Work Mining and Milling Company.—The annual meeting will be held April 13. It is reported that this company will take steps to open its property thoroughly.

IDAHO.

CUSTER COUNTY.

White Knob.—The smelter at Mackey is reported closed temporarily until repairs can be made to some broken machinery.

SHOSHONE COUNTY.

Highland Chief.—A ledge 8 ft. wide is reported opened at this claim on Pine Creek, southwest of Wardner. J. Goodrich is resident manager for St. Paul, Minn., men, who may erect a concentrator.

Little Chief.—The cross-cut on this claim near Mullan is in 500 ft., with indications good.

Nine Mile.—At this claim, 3 miles north of Wallace, a 3-ft. body of galena is reported opened. The vein is 40 ft. wide.

ILLINOIS.

JO DAVIESS COUNTY.

(*From Our Special Correspondent.*)

Elizabeth Lead Mines.—These mines were worked many years ago as dry diggings. The Elizabeth Mining and Milling Company and the Wishon Company are the two largest. The first is situated on section 25, and the second on section 14, T. 27, R. 2 E. The present amount of water coming from the Elizabeth Company's 2 shafts is 500 gal. a minute, at only 85 ft. deep. What the flow will be at 150 ft. remains to be tried. The Elizabeth Company has taken out of its 2 shafts over 1,000,000 lbs. of lead, most of it below water level. The Wishon Mine is said to have been a great lead producer in dry ground, and 10 ft. below water level. The ore is found in stringers, and runs some times massive, 3 and 4 ft. thick. Below water-level iron pyrites are found, assaying 44 per cent iron, with traces of gold and lead. Fifteen feet below water level sooty clays come in, which give 3 per cent copper, 6 oz. silver, trace of gold and trace of lead. Small particles of zinc-blende have been found in the lowest workings of the Elizabeth, and it is expected zinc will be found as the shaft is deepened.

Galena District.—Quite a number of mills are to be erected this spring. There are now 16 mills running, turning out a strong percentage of ore, and in every case but two magnetic separation can be used to advantage. There are now two plants using magnetic separators, and it has made the difference between profit and loss. Everything points to renewed activity for the first time since the war. There has been very little development in the district below water level.

Marsden.—This old mine south of Galena, sometimes called the Peru or Blackjack, is about to start again. The strong flow of water and the low price of jack was the cause of the mine shutting down, but owing to the higher price of jack and magnetic separators being used the mine will be brought to the front once more. It has the reputation of being the best mine in the district.

INDIANA.

MARION COUNTY.

Coal Miners' Wages.—The block coal miners and operators' convention secured the demand of the miners that all track layers, timbermen, drivers and inside day men shall receive $2.56 a day, firemen and pumpmen were increased 24c. a day, and blacksmiths will receive $2.50. The demand of the machine miners that the day machine men and helpers and motormen receive 12½ per cent advance was granted. A number of other demands were withdrawn. The scale committee has signed the contract and the different locals have ratified it.

Black Diamond Coal and Oil Company.—This company, an English syndicate, incorporated with a capital of $50,000,000, in South Dakota, has also reincorporated in Indiana, and will mine coal. The Indiana incorporators are W. K. Bellis, G. A. Deith, of Indianapolis; G. C. Chadwick, of Auckland, New Zealand, and Philip Lawrence and Marion Hoke, of Huron, S. D. The company has already secured leases on coal and oil lands.

PARKE COUNTY.

(*From Our Special Correspondent.*)

Parke County Coal Company.—Harry Crawford, of Chicago, Ill., former president of the Midland Railroad, has bought the property of this company, including 2 mines near Rosedale, 60 houses and the coal rights on 2,000 acres of land. The price paid was $250,000.

PERRY COUNTY.

(*From Our Special Correspondent.*)

Fruehwald.—This coal mine, which has been lying idle for 9 years, is in operation. It is now known as the Big Four Coal Mine Company. Peter Huek is president.

PIKE COUNTY.

(*From Our Special Correspondent.*)

Petersburg.—Wooley and Wooley, of Petersburg, have sold this coal mine and Pike County coal properties, covering 500 acres or more, to T. W. Wilsen, of Indianapolis. Additional shafts will be sunk.

IOWA.

MAHASKA COUNTY.

Economy Coal Company.—This company, of Oskaloosa, is sinking a shaft on the Redhead property along Four Mile Creek, and will at once develop the mineral rights of the 714 acres in that locality. There are two tracts, the Redhead and the Reinking. The shaft is being sunk under the direction of Isaac Evans, of Des Moines. Options on about 2,000 acres of coal land, north of the Economy Company, have been secured by T. W. Carpenter, and prospecting is under way. A road may be built up the Four Mile Valley to connect with the Des Moines Union and the Rock Island, and with the Great Western and Iowa Falls & Northern on the north.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

(*From Our Special Correspondent.*)

Copper Range Consolidated.—President W. A. Paine has returned to Boston after inspecting the properties. He announces that there is no truth in the reported absorption of the company by the Amalgamated Copper Company.

Copper Range Railroad.—The extension of this road from Houghton, via Hancock, Dollar Bay, Lake Linden and Laurium, is completed to Calumet. Log trains are coming in frequently from the South Range.

Mayflower.—The last exploratory shaft opened is down 560 ft. Drifting north at the bottom level is under way 235 ft. from the shaft. Nothing of exceptional value has been found.

Old Colony.—This company has unwatered its No. 1 shaft. A cross-cut will be run west from the bottom of the shaft to open the lodes revealed by the diamond drill work last summer. These will be cut at 580 ft. depth. Work continues at the New Colony shaft, a little copper being found.

Osceola Consolidated.—Forty drills are working at the North Kearsarge branch. No. 3 shaft is opening very good ground. At No. 6 shaft on the Osceola amygdaloid lode, 23 drills are busy. Sinking in No. 5 has been resumed, and 18 drills are in commission.

Rhode Island.—The Allouez conglomerate lode has been found in the cross-cut east from the bottom of No. 2 shaft. It is opened 1,000 ft. from surface. The lode is 20 ft. wide, and shows considerable copper.

COPPER—KEWEENAW COUNTY.

(*From Our Special Correspondent.*)

Allouez.—Timber and supplies have been delivered at the site of the new shaft and sinking will start. It will take a year to reach the Kearsarge amygdaloid lode at about 1,000 ft. The shaft will be an incline of 80° until it reaches the lode.

Mohawk.—No. 1 shaft is down below the 8th level. No. 2 is below the 7th, No. 3 below the 6th, and No. 4 below the 5th. Thirty power drills are operating.

COPPER—ONTONAGON COUNTY.

(*From Our Special Correspondent.*)

Adventure Consolidated.—A. H. Sawyer has been appointed mining engineer of this property, suceeding R. H. McDonald, resigned. Two heads at the stamp mill at Edgemere are treating 800 tons of rock daily. The stock piles on surface are shipping 175 tons of rock daily.

Hamilton.—A good start has been made on the exploration shaft. It is down 50 ft. on the lode. As

soon as the air compressor and drills go into commission sinking will proceed at the rate of 75 to 100 ft. per month. Eight men are employed. Capt. J. F. Finnigan, of Ramsay, is in charge, and St. Louis, Mo., men are interested.

Victoria.—No. 2 shaft is sinking to the 18th level. The shaft will reach that point April 1, and sinking to the 19th level will be commenced as soon as the plat is cut at the 18th.

IRON—MENOMINEE RANGE.

Corrigan, McKinney & Co.—The Tobin Mine, Crystal Falls, Mich., is prospectively very large, for the ore-body has been traced a long distance, and if it has depth is an important mine. The Armenia is proving a big property also, and its shipments this year will be heavy. The Great Western is showing up well, and with a new machinery equipment is prepared to mine a great deal of ore, if the market wants a slightly manganiferous ore. The Crystal Falls and Lamont are large properties, and the company is doing considerable development elsewhere on the range. The Armenia is developing into a large property, and though its ore is as soft red mud, it is not especially moist on analysis. The firm's shipments for 1902 from all ranges were 2,124,000 tons, which will be materially increased the coming season.

Pewabic.—This company is at the Wadpole Mine, near Iron Mountain; No. 2 shaft is down to the 7th level, and cross-cutting to the north is proceeding. It is proposed to connect No. 1 and No. 2 shafts with this drift. No. 1 shaft is down 350 ft.

MINNESOTA.

IRON—MESABI RANGE.

(*From Our Special Correspondent.*)

No less than 18 new mines are being developed as shippers for 1903 on this range, with 17 more that shipped slightly last year, and are now prepared to ship more heavily. Some of the older producers will curtail outputs, or the tonnage from the Mesabi this year would be unwieldy. Three of the new mines are United States Steel Corporation mines, but the rest belong either to independent steel makers or to sellers of ore in the open market. Several belong to intrests allied with the new Buffalo Steel Company, several to Jones & Laughlins, others to the Republic Iron and Steel Company, quite a group to Drake, Bartow & Co., and Joseph Sellwood, and to Corrigan, McKinney & Co.

Champion Mining Company.—This company, formerly with headquarters at Beacon (Champion), Mich., will remove its offices to Duluth, and Walter Fitch, manager of the mine and of the mining interests of Snyder & Co., will make his home at Duluth.

Elizabeth.—This property, belonging to the Buffalo Steel Company, is to be opened at once. It will have to care for part of the water that the Penobscot formerly lifted. A shaft will be sunk in the ore this summer, as it is an underground property.

Penobscot.—The pumps are out and the mine is filling with water. The removal of the pumps was a difficult feat, reflecting great credit on those in charge. Two Prescott compound condensing duplex pumping engines, as well as some 8 smaller pumps, the whole having a capacity of about 8,000 gal., have been lifted out, with the pipe connections, etc.

Winnifred.—This mine, belonging to Corrigan, McKinney & Co., has been shipping since January 1 to the Duluth blast furnace. The furnace mixture here has been Winnifred, Laura and Ashland, but with the opening of its own mine, the Cass, this will be changed.

IRON—VERMILION RANGE.

(*From Our Special Correspondent.*)

Diamond drills that have been working on Whitesides and Swallow & Hopkins lands, east of Ely, have stopped work and both have gone to section 30, at Ely.

Minnesota Iron Company.—This company's hard ore mines, at Soudan, are accumulating a larger stock pile than for manyyears. Now 100,000 tons of this winter's product are piled with 75,000 tons left over from last year, and there will be 215,000 tons on May 1. The monthly hoist is 22,000 tons. About 600 men are employed. All winter a large crew has been at work from No. 8 shaft on the 13th level drifting to a large lens cut by diamond drilling. The ore was reached 700 ft. from the shaft, and is now being opened. It is excellent ore. No. 9 shaft, which has been idle since 1891, has been reopened and about 40 cars of ore are hoisted daily. The deposit near this shaft was supposed to be worked out, but a new lens was recently found. No drills are working underground this year, and no attempt is being made to thus increase the tonnage in sight. The company is supervising the explorations at Armstrong Lake, where 2 drills are working in the n. e. quarter of section 14, T. 62, R. 14, and a drill is at Five-Mile Lake, section 19, T. 62, R. 14. It is currently reported that the exploration at Armstrong is very satisfactory. The Minnesota shipped last year 216,000 tons, and this year will probably ship 100,000 tons more. It has produced since 1884, the first season, 7,453,000 gross tons.

The steel lined shaft of Pioneer Mine is bottomed and in about 6 weeks the shaft will be connected with the mine workings.

MISSOURI.

ST. FRANCOIS COUNTY.

(*From Our Special Correspondent.*)

The advance in lead is again stimulating interest in lands in the disseminated lead belt, which are being quietly investigated by Eastern parties.

Buckeye Mill.—This mill, at Fredericktown, will be completed in about a month, when the plant will start. A switch has been built to the Iron Mountain Railroad, over a mile distant. Drifting is pushed underground.

Catherine.—This property is hampered by lack of coal, like all the other lead properties, but thus far has been able to get sufficient wood to keep running. Mr. Magenau, the superintendent, has resigned to go to Mexico.

Mine la Motte.—This estate has been turned over to the Eastern purchasers, as the last payments have been completed. H. D. Quimby, the former superintendent of the Desloge Lead Company, has taken charge.

Missouri Southern Railroad.—This road is now giving freight service to the Flat River District, and has raised the embargo on coal. The disseminated lead district has been severely crippled for the 2 months by the scarcity of coal due to the freight blockade on the Iron Mountain Railroad, the only inlet in the past. The new roads bring in cheaper and better coal.

St. Joe Lead Company.—Extensive trestles are being built at the Herculaneum plant to facilitate unloading coke, ore and flux. This will greatly increase the storage capacity, with a marked economy in handling.

MONTANA.

BROADWATER COUNTY.

(*From Our Special Correspondent.*)

Iron Age.—This Winston property is worked in blocks by tributers under the direction of General Manager Dodge for the company. The net profit has averaged about $4,000 per month for some time.

Stolen Sweets.—David Milner and associates of Winston are operating this property on a lease from the owner, Barton Sewall, of Chicago. The ore is an iron sulphide, shipping from 2 to 4 oz. gold to the ton.

FLATHEAD COUNTY.

(*From Our Special Correspondent.*)

Kintla Lake Oil Field.—A number of old rigs have been taken in during the winter on the snow. The field is known to extend north into British territory, where several wells have been started, some of which, it is claimed, have struck oil sand. Remoteness from rail transportation and lack of good wagon roads have hampered development. The roads are being improved. The district is best reached from the Montana side from Belton on the Great Northern Railway or from Fernie on the Canadian Pacific.

Snowshoe Mining Company.—Manager Bowers, of this company, is negotiating for building an electric line from the mine to Libby for transporting ore.

GRANITE COUNTY.

(*From Our Special Correspondent.*)

Billie Maddox.—This claim is on the south extension of the Sunday vein, and is under lease and bond for $15,000 to Dan Arms, David Conklin and associates, who have done 900 ft. of tunnel since last fall. Mr. Conklin, who is in charge, expects to have sufficient ore blocked out during the summer to justify a 10-stamp mill. Princton is the nearest post office.

Hughes.—Frederick Schmook and partner are operating this mine under a lease and bond. It is situated about 7 miles from Princton. At the bottom of a 100-ft. shaft the drift shows a pay streak 6 in. wide, averaging 100 oz. in silver and from $20 to $30 gold. The ore so far shipped has run $90 per ton. The shipments have been hauled down Gold Creek to Gold Creek Station, a distance of 15 miles.

Nancy Hanks.—This property at Garnet, from which Sam Ritchie took out some $300,000, and then lost the lead, is at present worked by leasers, who have again made it a producer. During February $10,000 was received for ore shipped, on which Mr. Ritchie received royalties amounting to $1,500.

Prospecting for Coal.—In the foothills along the Flint Valley, near Hall Station, of the Northern Pacific Railway, 2 seams of coal, one 7 ft. and one 5 ft. thick, are under development. The coal is a lignite free from slate. It is claimed that the railroad company has 80 acres under option for $80,000.

Sunday.—This property, operated by the Montana Gold Mining Company under the management of D. C. Waite, has 35 men on the pay-roll. The mine is under active development. A 3½-ft. Huntington mill is treating 6 to 7 tons of ore per day, and showing a nice profit. About $2,000 in bullion is shipped weekly. The property is about 11 miles from Flint Station, and adjoins the old Royal gold mine, 7 miles above Princton.

SILVER BOW COUNTY.

(*From Our Special Correspondent.*)

Emma.—The annual report of President Lee Mantle, of the Butte Mining and Development Company, says that the shaft has been sunk 800 ft., and that the total disbursements have been $184,722. Of this amount $70,249 has been paid for labor at the mine and $30,000 for coal. The report advises that the shaft be sunk to the 1,200-ft. level, and for this work an additional $100,000 is required. The present option on the Emma expires in October, 1903, and calls for the payment to the owner of $105,000.

NEVADA.

ELKO COUNTY.

A new mining field is being developed in Nevada about 12 miles from Oasis, Cal. The only company thus far interested is the Hector Mining Company, of Bakersfield, but a number of independent miners are at work. The claims are at 7,000 ft. elevation, and wood, water and grass are scarce. Some assays run very high. The inhabitants have dubbed the camp Windypah.

NYE COUNTY.

Tule River Placer Mining Company.—This company has been organized at Tonopah. Water for hydraulicing will be piped a distance of 18 miles.

Pactolus, a new Nevada camp attracting attention, is about 32 miles south of Berlin, and 87 miles west of Tonopah. A number of Grass Valley, Cal., mining men have gone to the new camp. The camp is 87 miles west of Tonopah.

WHITE PINE COUNTY.

McKinley Mining Company.—This company, at Ely, has made the first payment on the purchase price of the Aurora group of 5 claims.

New York & Nevada Copper Company.—About 35 men are working on this company's new smelter at Keystone.

Rocco-Homestake.—This mine, at Hamilton, Nev., produced and marketed ore to the net value of $46,925.28 during the year 1902, while the management has 5,000 tons of good ore on the dump and in sight in the mine which will be consigned to the smelters as soon as the season opens more fully, by which time it is anticipated the amount of ore available for the market will have reached all of 7,000 tons. The company is in excellent financial condition. Bert L. Smith, of Eureka, is practically in charge of this producing and dividend-paying mine.

NEW JERSEY.

WARREN COUNTY.

New Jersey Cement Company.—This company has been incorporated to build cement works at Stewartsville. Options have been taken on 600 acres of land, and work is to be begun at once. The officers are: President, Morris Faust, Belvidere, N. J.; secretary, Dr. Cummins, Belvidere; manager, A. H. Bigelow, Stewartsville. The capital stock is $1,600,000.

NEW MEXICO.

LINCOLN COUNTY.

(*From Our Special Correspondent.*)

Eagle Mining Company.—This company, operating near White Oaks, has materially increased its capital stock, and intends to use the water of Bonito Creek by a dam near Krout Gulch for a large electric light and power plant. A large dam will be built for storing the storm waters. The company has recently closed a contract for a large mill.

Free Gold Milling Company.—This company, of Nogal, has recently purchased a well-drilling outfit, which will enable it to sink to 3,000 ft.

Hopeful.—At this mine plans are out for a mill with a daily capacity of over 300 tons. The ore-body is reported 200 ft. wide.

Rico Mining and Milling Company.—This company, at Nogal, with George E. Sleigh as general manager, has recently obtained about 300 acres of placers in the Jicarrilla Mountains.

SOCORRO COUNTY.

(*From Our Special Correspondent.*)

In the Magdalena District considerable ore is being shipped. Special activity is shown in the Graphic Mine, operated by Capt. Fitch and C. T. Brown, who have recently added the Ida Hill group to their holdings.

In the Socorro Mountains some work is going on, and it is understood that several of the properties will be patented shortly.

In the Oscura Mountains in the eastern part of the county, the Colorado Fuel and Iron Company is working under bond some hematite deposits explored a year ago by F. A. Jones. In case the deposits prove satisfactory a 20-mile spur will be built to reach the Chicago, Rock Island & Pacific Railway.

Mogollon Gold and Copper Company.—This com-

pany, recently organized by Thomas J. Curran, president, has started up the Cooney Mill. It is reported that the mines connected have produced already $5,000,000 in gold and silver. The new mill has a capacity of 35 tons a day, and saves about 90 per cent of the value. There are now 6 levels in the Cooney Mine, formerly known as the "Silver Bar." In the Cooney camp there are more than 150 locations. Half of these have shipped ore. A 75-h.p. boiler and an air compressor have been ordered for the mine. The concentrates go to the El Paso plant of the American Smelting and Refining Company. W. J. Weatherby is general manager of the company, and T. F. Cooney is superintendent of the Cooney Mine.

Socorro County Gold Mining Company.—This company, under the direction of Dr. C. L. Herrick, at Cat Mountain, 12 miles from Magdalena, is rapidly pushing development. Iron buildings have been erected, and mill machinery is being installed. The main shaft of the principal mine is being sunk rapidly. Some difficulty has been encountered with water, but adequate pumping machinery will soon obviate this.

OHIO.

STARK COUNTY.

The miners of the Massillon District have decided to strike on April 1. The scale committee, consisting of 10 miners and 10 operators, reporting that it could not effect a settlement. The present agreement expires on April 1. The miners demanded 4 ft., be taken as the standard thickness of a vein, with an increase in the price of mining of 4c. a ton for every 3 in. under that thickness. The strike will involve 2,000 men.

PENNSYLVANIA.

BITUMINOUS COAL.

Coal Miners' Wages in Central Pennsylvania.—The miners and operators of the Clearfield region on March 20 agreed on this scale, to go into effect on April 1: The pick mining rate shall be increased 10 per cent; the price of machine mining advanced 12 per cent; 8 hours to constitute a day's work for all labor inside of the mines, except pumpmen and monthly men, who are to continue on present conditions at 10 per cent advance; rope riders, motormen, cagers or drivers hauling outside from side tracks to work the necessary extra hours to clean up coal on side tracks, and to be paid the same rate per hour for the extra time worked; drivers $2.40, and all inside labor of similar character now receiving the same wages as drivers to be paid the same rate; all other classes of inside labor to continue at present rate of wages for 8 hours' actual work at working place. Trappers to receive a minimum wage of $1 per day; all outside labor engaged in dumping and handling of coal, including mule carpenters and blacksmiths, advanced 10 per cent on present basis, and to work the hours required and to be paid for the number worked; all other classes of outside labor at mines to be advanced 10 per cent on present basis, except it is agreed that all firemen, engineers, compressor men, pumpers, ash wheelers and monthly men shall work the same hours as at present, but receive 10 per cent advance over present wages.

This agreement will affect over 25,000 men.

SOUTH DAKOTA.

CUSTER COUNTY.

(From Our Special Correspondent.)

Black Hills Porcelain Clay and Marble Company.—The company is shipping 30 tons of mica monthly. Since the death of President B. R. Noble the company has been reorganized, and the owners of large blocks of stock obtained for promotion purposes have been compelled to surrender it.

Cuyahoga Mining Company.—Work is in progress in a tunnel and a shaft. A steam hoist, air compressor and drills have been purchased for the shaft, which is to be sunk 500 ft., and a mill is proposed for the coming summer. The officers and stockholders reside at Cleveland, O. H. A. Henke is president; H. G. Wickoff, vice-president; H. C. Herman, treasurer; J. A. Foastner, secretary, and F. A. Gira, of Custer, manager.

Grantz Gold Mining Company.—Cross-cutting has started from the bottom of the St. Elmo shaft, 200 ft. deep.

Northwestern Mining Company.—A. T. Feay, superintendent, has shipped a ton of ore from the Mayflower group to Denver for experimental treatment.

Saginaw Gold Mining Company.—The shaft is nearly 300 ft. deep, following a diamond drill hole.

Spearfish Mining and Reduction Company.—The bullion product for February is reported as nearly $25,000. The cyanide plant was closed 5 days during the month for repairs. The ore averaged nearly $6 a ton.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Golden Crest Mining Company.—A contract has been awarded to enlarge the cyanide mill to double its present capacity. The stamps will be increased from 5 to 10, and there will be 20 tanks instead of 10 in the leaching department. The present mill has been running 3 months.

Horseshoe Mining Company.—Suit has been started in this State by Maurice Lindholm, of Chicago, for the recovery of $3,700 alleged to have been obtained for shares in the company by fraudulent representations, and attachments have been levied upon all the company's mining property. Several similar suits are to be started.

United Ruby Gold Mining Company.—A raise has been started from the floor of the tunnel to surface.

UTAH.

(From Our Special Correspondent.)

Ore and Bullion Settlements.—For the week ending March 20, 1903, the Banks of Salt Lake City report the following payments for ores and bullion:

American Smelting and Refining Company bullion	$215,000
Gold, silver, copper and lead ores	188,100
Gold bars	36,400
Total	$439,500

BEAVER COUNTY.

(From Our Special Corrcspondent.)

Copper Mountain.—Timbering the shaft is nearly finished. Work on the mill is said to be progressing rapidly. The foundations of several buildings have been laid.

Horn Silver.—The samplers report the receipt of 2 cars of ore from this Frisco property during the week ending March 20.

Montreal Group.—A. B. Lewis, of the Majestic Company fame, has gone East with an option on this property for $250,000.

Utah Southern Mining Company.—This company is patenting its properties.

BOX-ELDER COUNTY.

(From Our Special Correspondent.)

Century.—The report that this company's stamp mill has burned is thought to be a rumor to influence the market. President Madsen is at the mine.

JUAB COUNTY.

Columbia.—At the recent annual meeting these officers were elected: James A. Cunningham, president; W. S. McCornick, vice-president; F. B. Cook, secretary and treasurer; these, with George W. E. Dorsey and James A. Cunningham, Jr., completing the board. Secretary Cook stated that since January 1 the company had marketed ores and concentrates, which yielded about 148,000 lbs. of copper. The 75,000 lbs. produced during February yielded $5,900 to the company. Twenty-one men are now employed at the mine.

Daly-Judge.—The 300-ton concentrating plant is ready for work. It has had a satisfactory trial run. J. J. Broughall, of Park City, is superintendent.

(From Our Special Correspondent.)

Tintic Shipments.—Shipments for the week ending March 20 were: Martha Washington, 1 car; Gemini, 13 cars; Lower Mammoth, 2 cars; Grand Central, 41 cars; Mammoth, 7 cars; Eagle & Blue Bell, 2 cars; Uncle Sam, 6 cars; Victor, 6 cars; Ajax, 3 cars; Yankee, 10 cars.

Mammoth-Grand Central.—An injunction granted by Judge Marshall restrains the Grand Central Mining Company from taking out ore from the strip of ground 160 ft. north of the "1,100-ft. line."

Martha Washington.—This Tintic property is said to show 3 ft. of ore in the upraise. A shipment of 60 tons has been made.

May Day.—Five feet of lead-silver ore are reported in a drift south from the 200-ft. level.

PIUTE COUNTY.

(From Our Special Correspondent.)

B. W. & H.—This Gold Mountain property reports a strike in a drift from the main tunnel towards Annie Laurie ground. The property has been a steady shipper in a small way for some time.

Revenue Gulch.—A company of Chicago men, with local interests, intend, it is reported, running a 4,000-ft. tunnel near Marysvale to tap the copper belt ores 2,000 ft. from surface. It is said a pool of $75,000 has been formed

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Boston Consolidated.—This Bingham property, according to reports, is to have a smelter in the valley conveniently near the camp. It is said the plant will cost about $300,000.

Highland Boy Smelter.—For the week ending March 20 this smelter reports sending East 4 cars of copper bullion, aggregating 240,000 lbs.

United States Smelter.—This plant reports the shipment East of 184,065 lbs. of copper bullion for the week ending March 20.

Yampa.—It is said to be an assured fact that the Tintic Development Company will erect a smelter for this property as soon as the weather will permit.

SUMMIT COUNTY.

(From Our Special Correspondent.)

Park City Shipments.—During the week ending March 20 the Mackintosh Sampler reports the receipt of the following consignments: Daly West, 3,640,290 lbs. ore, and Daly-Judge, 129,310 lbs. ore; total, 3,769,600.

Daly West Mining Company.—The recently elected officers are J. E. Bamberger, president and general manager; J. D. Wood, vice-president; W. S. McCornick, treasurer; Josiah Barnett, secretary, and A. W. Mountenay, assistant secretary.

Keystone.—A new pump has been ordered.

TOOELE COUNTY.

(From Our Special Correspondent.)

Stockton Shipments.—For the week ending March 20 the shipments reported are: Ophir Hill, 10 cars concentrates.

Galena.—The hoist and shaft house at this Fish Springs mine have burned. There is no information as to how long the mine will be closed, probably not over one month.

Honerine.—This Stockton property reports that the tunnel has cut a ledge that shows 12 in. of good lead ore. Its extent will be determined.

Ophir Hill.—The poles for the power transmission line are up to this mine, and the motors at the mine are nearly ready.

Utah.—Owing to the conditions of the roads shipments will have to stop for a while.

VIRGINIA.

HALIFAX COUNTY.

(From Our Special Correspondent.)

Seaboard Copper Company.—This company's mines are 3 miles from Virgilina. Three shafts are sunk on a 9-ft. quartz vein, carrying bornite. The deepest work is 180 ft. The tract contains 135 acres. There are over 1,000 tons of ore on the dump. The run of the mine is estimated at 4 and 5 per cent copper. The mines are well equipped with air compressors and hoisting machinery, and are under the management of A. W. Tucker, formerly of the Union Copper Mines. About 25 men are employed. The company's office is at 77 Summer Street, Boston, Mass.

WASHINGTON.

FERRY COUNTY.

(From Our Special Correspondent.)

Iron King.—This mine situated near Curlew, about 20 miles north of Republic, yields hematite ore carrying gold and silver. Good assays have been obtained. A tunnel, in 40 ft., will have to be driven about 100 ft. to strike the vein. An adjoining property was recently bonded by Seattle, and Minneapolis, Minn., parties for $15,000.

Lone Pine-Surprise Consolidated Mining Company.—The purchase option given by the trustees to Chas. Theis, of Spokane, Wash., was confirmed by the shareholders at Spokane on March 10. Some of the minority shareholders express discontent, but there appears on other way to pay off the indebtedness and save the company's property. The working force in the Lone Pine Mine is now 26 men. Since work was resumed 8 car-loads of ore have been shipped to the Crofton Smelter, under a 3 months' contract.

Lucille Dreyfus.—Duplicate parts of the machinery missing have been supplied, and the vein is being cross-cut from the bottom of the winze.

Mineral Hill Consolidated Mining Company.—In a drift south 175 ft. from the portal of the tunnel a large body of fine shipping ore has been cut. The property has been examined by a consulting engineer, and machinery has been ordered.

Morning Glory.—About 2 car-loads of average quality ore are ready for shipment, and 3 men are employed below the adit level, getting out more from a small but rich vein.

Quilp.—It is reported that a drift on the No. 5 (lowest) level of this mine at Republic, has cut rich ore, but nothing can be learned from the management. The mine is now employing 25 men, but owing to the scarcity of coke at the smelters no ore is shipped for the time being. Work in the mine is confined to exploring the vein.

San Poil.—The winze on the lower tunnel level is down 125 ft. Eight men are employed on two shafts.

Zala M.—A winze is being sunk on the vein from the 300-ft. level. The vein is 3½ ft. wide, with a rich streak. The mine is being put in readiness for shipping as soon as the roads are in condition.

OKANOGAN COUNTY.

(From Our Special Correspondent.)

Ben Harrison Group.—The superintendent has been East conferring with the owners relative to machin-

ery. On his return it is expected a large force will be employed.

Opal.—Report says that the ore is increasing in quantity and value. A cross-cut tunnel will have to run 350 ft. further to tap the vein.

Oregon.—The Wyandot Company is employing 6 men developing a fine body of ore.

FOREIGN MINING NEWS

AFRICA.

TRANSVAAL.

The production for February is reported by the Chamber of Mines at 196,513 oz. fine gold; which is 2,766 oz. less than in January. For the two months ending February 28 the total output was 395,792 oz. fine gold, or $8,181,021, against 151,745 oz. for the corresponding period in 1902.

CANADA.

ONTARIO—LAKE OF THE WOODS DISTRICT.

(*From Our Special Correspondent.*)

The Canadian Pacific Railway has awarded the contract for a double track from Rat Portage to Fort William. Foley Brothers are the contractors. One hundred and fifty men are already engaged for the work.

Indian Joe Mining Company.—Henry H. Feyling, managing director of this company, of Newark, N. J., has visited the mine and is much pleased with developments. He has ordered an 8-drill duplex compressor and a 50-h.p. boiler, to be shipped immediately to Rat Portage. Eighty feet of drifting have been done on the 80-ft. level, and 10 ft. of cross-cutting exposed a 5-ft. vein. A number of samples averaged $11.85 gold per ton. A new boarding house and other buildings are being erected.

Great West Mining Company.—This company is incorporated under the laws of Ontario. All shareholder meetings are held in New Jersey. Henry H. Feyling is treasurer, and Albert L. Babcock president. The capitalization is $3,000,000. This company owns 7 locations in the Lake of the Woods and Manitou districts, and is starting work on City Bay, Shoal Lake, near the Indian Joe, where a shaft is being sunk 200 ft. The vein is said to be 34 ft. wide. Assay values from surface work show $2.50 to $10.

Nino.—D. D. S. Potter, of Buffalo, N. Y., accompanied by his son, F. B. Potter, manager of the mine, and C. E. Brent, has visited the mine. A gang of men is setting up an 8-drill compressor, a hoist, pumps and 3 machine drills. The mine is reported looking very well. A sawmill is also being erected.

Shoal Lake District.—The recent big strike at the Mikado Mine has called attention again to this district.

SOUTH AMERICA.

FRENCH GUIANA.

(*From an Occasional Correspondent.*)

It will probably interest diamond dealers in the United States to hear that prospecting for diamonds has been started in French Guiana. It is well known that quite a number of diamonds have been discovered in British Guiana, and it is believed that similar conditions, existing here, will lead to the same results. A company has been organized with headquarters at Cayenne to furnish sufficient capital for the prospecting work. M. E. LeBlond, British vice-consul at Cayenne, is at the head of the company, and Mr. D. E. Headley has charge of the prospecting work.

MINING STOCKS.

(Full quotations are given on pages 506 and 507.)

New York March 25.

There is some hesitancy in the copper group, as rumors hint at speculation in the advancing prices for the metal, although the increased consumptive demand would indicate otherwise. Nevertheless, copper shares have again taken the toboggan, and are selling at nearly the same prices as were quoted some time ago. As was to be expected under the circumstances, Amalgamated has fallen from $73½ to $68, and Anaconda from $30⅞ to $28½. Simultaneously the coppers on curb have lost support. Greene Consolidated, of Mexico, dropped to $24⅞, and British Columbia to $4½. White Knob, of Idaho reappeared at $11¼ to $11 on small sales. Tennessee sold at $32½@$30.

Trading on curb is again criticized, and justly so, because of late brokers have recognized stocks of mining companies with large capitalizations and little prospects. Such speculation is to be condemned, as it does irreparable injury to legitimate mining enterprises. We do not wish to discourage investment in good mining shares called on curb, but we disapprove of dealings in stocks that are floated for no other purpose than gambling.

On 'change Daly, of Utah, shows more interest at $3.10@$3.20, which is somewhat higher than is being paid in the Salt Lake market. Ontario Silver sold at $7@$6. Horn Silver brought $1.35.

An odd sale of Quicksilver common, of California, is reported at $1⅞. Standard Consolidated, long silent, came forward at $3@$3.50.

Silver Hill, of Silver City, Nevada, a dividend payer, sold at 59@64c.

Comstock stocks are again depressed by assessments. Caledonia, which is marketed at $2.50, has called 15c. Ophir weakened from $2.15 to $2, because it announced another assessment of 15c., making 30c. or $30,240. Consolidated California & Virginia is lower at $2, and Sierra Nevada at $1.05. Gould & Curry increased its assessment from 10c. to 15c., making 25c., or $27,000 this year. The stock brings 39@41c., which is somewhat less than last week.

Alice, of Montana, sold again at 35c.

Colorado stocks show some improvement in demand, but the volume of trading is small, as investors are awaiting the outcome of the mill and smelter men's strike. Higher prices for silver and lead have encouraged the Leadville stocks, and a few of the old favorites have been dealt in. In the Cripple Creek gold list, Portland continues weak at $1.35, and Elkton at 36c., while Isabella has fallen to 20c.

Auction sales recently were 100 shares Hudson River Ore and Iron Company, par $100, at $36 for lot; 19 shares Chateaugay Ore and Iron Company, first preferred, par $100, at $25½, and $50 first preferred script at $6; 17 shares Lackawanna Iron and Coal Company, par $100, at $85.

Boston. March 24.

(*From Our Special Correspondent.*)

A very apathetic condition is manifest in the local stock market, and the public is taking little interest in stocks, apparently satisfied to wait until more favorable conditions present themselves. Money, which is the factor, is becoming more easy, but not to such an extent as to invite a bull campaign in copper shares. The stock market has certainly not discounted the rise in copper, and this is the favorable feature. As has been remarked before, mining shares are not selling above the prices prevailng when copper was selling for 13c., and it would seem as if an advance was due. One thing has come to notice, and that is the Lake people are taking no interest in local stocks, as they have heretofore. This is due to local speculations, in which these people have become interested, much to the disgust of Boston brokers.

The speculation in the low-priced coppers, remarked last week, has died out. Elm River, which touched $5.37½, has dropped back to $4.25. Over 10,000 shares were traded in one day. The annual meeting of this company occurs April 15. Nothing of an encouraging nature is reported from the property. Allouez advanced $1.37½ to $8.50, but is back to $7.37½. Speculation has been founded on expected favorable developments at the mine. United States Mining has had a $1.25 drop to $24.75 on the throwing out of a suit brought for the fraudulent extraction of ore from property claimed by the United States people. The whole matter is considered of little importance. The smelter is handling about 750 tons of ore per day, with five furnaces, but they are expected to handle 1,150 tons per day when running full capacity. Utah Consolidated is well held, and is being absorbed at current prices. It has varied but 75c. for the week, closing at $29. Wolverine rose $4 to $77, closing at $74.50. Tamarack is off $5 to $175. The annual report shows a profit of $197,308 for 1902. The company got an average of 11.87c. for its copper, but the cost, including construction and other charges, was 11.90c. The Franklin report shows a mining profit of $49,694 for the year 1902, even with a trifle over 12c. received for copper.

Dominion Iron and Steel and Dominion Coal again furnished excitement. The former broke $8.25 to $28.50, rallying to $34, and the latter broke $9.50 to $121.50, rallying to $116.12½. Both have been disturbing factors in the market. In the case of Dominion Iron it has been a case of too much booming, and the stock is now suffering natural reverses.

Mohawk rose $2 to $56.50, but lost it. The annual report shows expenses $18,766 in excess of income, which latter includes $340,248 assessment money. The $2 assessment paid early this year, however, furnishes ample working capital. The company got 11.65c. for the copper sold. Winona has declined almost $1 in the week to $12.12½. Speculation in it for the time being has died out.

American Zinc spurted $1.25 to $12.75 on expectations that the company will build a mill to treat its own zinc ore. Osceola closes 50c. below a week ago at $72.50. Calumet & Hecla is off $19.50 from the high to $530.50, and Copper Range has lost $1.75 to $69. Centennial has lost $1.87½ to $27. Bingham $1 to $33.75, and Trimountain $3 to $95.

Shannon Copper has shown more or less activity and strength, selling at $13.37½@$14.25. It is understood that a more vigorous policy is to be adopted at the Mass Mine so that the two heads of stamps can be supplied with rock.

Colorado Springs. March 20.

(*From Our Special Correspondent.*)

Light trading, with lower prices, again characterized the week's business on the Mining Exchange. The critical state of the strike situation, coupled with an absolute absence of all foreign orders, resulted in reducing the volume of business to 137,000 shares, the smallest amount of stock sold on the local board for several years; in fact, to-day was the lightest in point of sales since the slump of 1895, in all probability, as there were but 17,000 shares traded in for the day. The mining stock market is in poor shape, and no revival can be looked for for some time, as the strike situation which is responsible for the present state of affairs, is a most serious factor and liable to continue as such for an indefinite period. The sales of the week were: 20,000 on Monday, 53,000 Tuesday, 23,000 Wednesday, 28,000 Thursday and 17,000 to-day.

Elkton sold light at 37c. on Monday, closing the week with 34c. bid, with 36c. asked. El Paso sold from 57½ to 57c., closing at the lower figure to-day. Isabella sold at 19½@18c. this week, closing in poor form. Portland fared a little better than its neighbors, and recorded an advance, selling from $1.32 to $1.30¼, and back to $1.33. Pinnacle sold at 4¾c., and was a new trader coming to the front because of a showing by several of the lessees.

Salt Lake City. March 20.

(*From Our Special Correspondent.*)

The stock market has advanced in tone, and the volume of business again increased this week. While the general average of the prices cannot be said to have advanced many points, the advance in Daly West, Daly-Judge and one or two others has been the strength of the market. The drop in Century from 74 to 40c. was caused by rumors of the burning of the reduction mill. California has receded to 4½@6½c., with the transfer of 15,450 shares. The drop in this stock was caused by the calling of the last assessment along with other adverse opinions. For some undiscoverable reason Consolidated Mercur has sold as low as $1.53 this week, but recovered at the close to $1.59, with 8,466 shares dealt in. The heaviest traders on the list were Daly West, 2,450 shares, at $41.75@$38.85; Daly Judge, 5,915 shares, at $11.52½@$10.50; La Reine, 19,700 shares, at 5@4¾c.; May Day, 47,050 shares, at 19¼@16⅞c.; Sacramento, 18,700 shares, at 27⅝@26⅝c.; Wabash, 31,900 shares, at 29¼@26¼c. The Exchange closed on the sale of 249,196 shares, which brought $245,265, an advance of about $85,000 over last week's business.

San Francisco. March 21.

(*From Our Special Correspondent.*)

Stocks have been rather quiet this week. There has been some pressure to sell by small holders and speculators.

Caledonia sold at $2.50@$2.55; Consolidated California & Virginia, $2.10; Sierra Nevada, $1@$1.65; Yellow Jacket, 60@65c. Other stocks generally showed a range somewhat lower than last week.

In oil stocks there has been somewhat less buying, but prices were pretty well maintained. Peerless sold at $15.75; Twenty-eight, $3.25; Reed Crude, 32c.; Independence, 13c.

Sales on the California Stock and Oil Exchange in February were 322,443 shares for $219,358. This compares with 267,019 shares for $255,202 in January.

COAL TRADE REVIEW.

New York, March 26.

ANTHRACITE.

The report of the Anthracite Strike Commission, considering the diversity of opinions probably held by the commissioners, is for a unanimous report, remarkably clean-cut in its utterances on the right to work, the responsibilities of labor unions, and the present composition of the United Mine Workers. The awards show discrimination and good judgment, and are as fair as could be expected. The matters of most interest to the trade at large are the Commission's comments on the decreasing supply of anthracite, the increasing cost of mining and the possible limitation of production by the inevitable increase in prices. The report virtually says that anthracite is to sell for more and takes the price of $4.50 at tidewater, proposed by President Baer, as the basis of its sliding scale of wages. Just what the railroads will do as to spring prices is not officially made known yet, but in view of the Commission's report, there is good reason for believing that the April prices for free-burning white ash coal, f. o. b. New York Harbor shipping port, will be $4.25 for broken, and $4.50 for egg, stove and chestnut.

Just at present, owing to the remarkably mild weather that has prevailed in most anthracite burning territory this month, and the possibility of spring

prices going into effect on April 1, demand is very light, in most remarkable contrast to conditions two months ago. Reports from the mines are that many collieries are curtailing output, owing to the dullness of the market, and the shipments this month will very likely fall below the record of March, 1902. A great extent of country is practically bare of supplies, however, having just enough to last until the spring season opens, and there is every indication that producers will have a flood of orders to fill during April—orders for amounts far beyond the capacity of collieries and railroads to produce and transport.

An early opening of lake navigation is pretty certain, and a large fleet of steamers will probably sail from lower lake ports in the first week of April, two boats having already got through the Straits of Mackinac into Lake Michigan. This early opening of navigation will enable dealers at upper lake ports, if they so desire, to take full advantage of spring discounts, and will doubtless lead to heavy shipments up the lakes.

In the East trade is very quiet indeed. Practically all dealers have sufficient supplies to last till they can get a little coal at the new prices.

BITUMINOUS.

The Atlantic seaboard bituminous trade is a little more active; transportation from the mines to tidewater has improved, and car supply at the mines is better. The opinion prevails, however, that as the railroads have all the business they can handle, if the better car supply continues blockades will ensue, followed by embargoes on shipments. Reports are that contracts for the coming year are still being closed to some extent, and will be for the next month. The better grades, even at the higher prices asked, are more sought by consumers wishing to place contracts than are the poorer grades. Contract prices, outside of specialties, run from $3.10 to $3.65. In the speculative market prices are $2.80@$3 for ordinary grades of Clearfield, f. o. b. New York Harbor shipping port.

While the question of labor troubles in some fields is still unsettled there is a general feeling that neither side wants a strike just now. Producers are willing to advance wages, but stick at recognizing the union. Higher wages mean higher prices for coal by consumers.

In the far East trade is dull. Producers are generally coming to the idea of closing contracts at prevailing prices. Offers of foreign coal affect not only the contract market, but also purchases of domestic coal in a speculative way. Along Long Island Sound trade is quieter than it was, though considerable coal is going forward on old contracts, as all producers are trying to clean up all balances due on contracts before the year ends on April 1. Trade at New York Harbor points is quiet. All the coal required is forthcoming, and apparently at weakening prices. The all-rail trade is still taking considerable coal, some of which must be going into storage.

Transportation from the mines to tidewater is up to schedule, and at times is even better. Car supply just now ranges around 75 per cent. In the coastwise vessel market, vessels have been detained by fogs and head winds, and are in poor supply at the leading ports. Current rates from New York are 80@85c. to Boston, Salem and Portland, and 70@75c. to Long Island Sound ports. From Philadelphia rates are $1 to Boston, Salem and Portland, $1.05 to Portsmouth, and 85@90c. to Long Island Sound.

Birmingham. March 23.

(*From Our Special Correspondent.*)

During the past week the Galloway Coal Company, operating mines at Galloway and Carbon Hill, in Walker County, made a contract for the next year with its miners, effective April 1. This company deals with the Knights of Labor instead of the United Mine Workers of America. During the present twelve months, expiring March 31, the company has been paying 50c. per ton, against 55c. paid the United Mine Workers. The new contract calls for an advance of 10 per cent or 5c. per ton. The scale convention of the United Mine Workers of America will be held in Birmingham on or about June 15, and while no intimation is given by the miners as to what will be asked for in the new contract, it is believed that a renewal of the present contract will be made. The miners have been getting the maximum wage scale for the twelve months.

The Alabama operators who sell in the domestic market altogether have no furnaces to supply or do not require any quantity of coal for their own use, are making contracts for the product for the summer. Indications are that there will be need for all the coal that can be mined through the entire year.

During the past week declerations of incorporations have been filed in the courts at Birmingham as follows: Jefferson Coal and Coke Company, incorporators, R. H. Pearson and B. F. Roden, of Birmingham; Frederick N. Rix, of Hot Springs, Ark.; capital stock, $200,000; to mine coal and manufacture coke in Walker, Blount and Jefferson counties. The Sayre Mining and Manufacturing Company, with capital stock $150,000, right retained to increase to $1,000,000; incorporators, Robert H. Sayre, Pennsylvania; Joseph Weisel, John H. Adams and James E. Webb, Birmingham; to produce coal, manufacture coke, mine ore and manufacture iron and steel. Both companies have good coal properties in this State.

The production of coke is holding up well. Some of the companies are now selling in the market, which has not been done for some time past. The Tutweiler Coal, Coke and Iron Company is building 50 coke ovens at the Short Creek coal mines on the Ensley Southern Railroad. The Lacey-Buek Company is preparing to build 100 more ovens near Trussville Furnace. No less than 1,000 coke ovens will be completed and put in operation in this State during the present year. The coke production then will be sufficient to meet demands in this State, and will cut off all of the importing of coke from other States in the South.

Chicago. March 23.

(*From Our Special Correspondent.*)

Quiet seems to have settled on the coal market. Prices have reached a basis from which they are not likely to vary much for a month at least. Naturally they are higher than normally at this season. Many causes combine to prevent the sinking to the basis of former years. Smokeless is quoted at $4.50, and is in much demand. Hocking brings $3.50, Youghiogheny $3, West Virginia $2.75@$3, Illinois and Indiana lump and egg, $2.50 for the best. There is no shortage of any grade, such as existed generally in the winter months, and no prospect of shortage. Many dealers, indeed, complain of the amount of Western bituminous that has been poured on the market since the railroads perfected the transportation of coal. Country trade is reported brisker than city trade, with a strong demand generally for the higher-priced kinds of bituminous.

Anthracite is much more plentiful, owing to increased supply and reduced consumption. It sells in car lots for $7 and at retail for $8. Dealers anticipate a comparatively light demand for anthracite this coming spring and summer on account of the apparently popular idea, with consumers that it will be cheaper in the summer than the spring. Many users of anthracite also have found success with high-grade bituminous, particularly smokeless, and are not likely to change back to anthracite.

The continued use of bituminous universally has so increased the smoke nuisance as to call forth protests from the public, and demands for more stringent anti-smoke laws, which will probably be made and enforced soon. This will naturally tend to bring the smokeless coals into greater favor and to increase the use of anthracite.

Cleveland. March 24.

(*From Our Special Correspondent.*)

Coal shippers by the lakes have been holding meetings of late with an effort in view of getting the prices fixed for fuel to the Northwest for the coming year. A few of the prices have been named, but not all of them. The announcements will be made in all probability in another week. The demand for coal in the Northwest is heavy, and shippers are already loading boats. Navigation is open to Lake Michigan, and boats will begin starting there before the week is out. The movement to the lakes from the mines is very heavy, and the business is brisk. There is a good deal of talk about rates. Some of the vessel owners have already chartered a few boats to Lake Superior at 50c. for the first trips, and are having no difficulty whatever in placing them. The rates to Milwaukee have not been fixed, but will probably be 60c. The first charters will be announced during this week, as that coal will soon be moving.

Throughout this territory the coal situation is improved. The easing up on the demand for purely domestic coal has relieved the situation for the factories and the mills, and they are getting everything that is necessary. The coke situation, however, might be improved. The opening of the season of navigation will detract from the supply of the factories more than the domestic demand could do. The railroads are in condition to handle almost any amount of coal, as their equipment is abundant, and the roads are no longer hampered by the cold weather.

Pittsburg. March 25.

(*From Our Special Correspondent.*)

Coal.—More mines are in operation this week than for several months, the supply of railroad cars being a trifle more satisfactory than heretofore. A stiff advance in prices within a week is rumored, but an official confirmation cannot be obtained. The demand continues heavy, but is expected to be still greater if the threatened strike in West Virginia occurs. Navigation on the rivers has been suspended for a week, but a rise is expected to make a boating stage by to-morrow. There is but little coal loaded, and shipments will not be heavy. Many towboats are expected to return from the Southern ports with empty boats and barges.

Connellsville Coke.—There has been a heavy increase in production and shipments during the past week. Contracts for furnace coke for second half delivery are now being made by independent producers at $4 a ton. The *Courier*, in its last weekly report, gives the production in the Connellsville region for the previous week at 246,126 tons, a gain of 423 tons. Shipments aggregated 11,651 cars, distributed as follows: To Pittsburg and river tipples, 3,581 cars; to points west of Pittsburg, 6,179 cars; to points east of Connellsville, 1,891 cars. This was an increase of 1,352 cars compared with the shipments of the previous week.

San Francisco. March 21.

(*From Our Special Correspondent.*)

The coal market continues quiet and unchanged.

Yard prices to dealers for Pacific Coast coals in large lots are as follows: Wellington, $8.50; Southfield, $8; Rosslyn, $7; Seattle and Bryant, $6.50; Coos Bay, $5.50; white ash, $5. Rocky Mountain coals in car-load lots are quoted at $14 for Colorado anthracite, and $8.50 for Castle Gate, Clear Creek, Rock Spring and Sunnyside. Eastern coal in cargo lots is at present nominal, but quotations continue at $14 for Pennsylvania anthracite and $12 for Cumberland. Foreign coal in cargo lots sells as follows: Welsh anthracite, $13; cannel, $8.50; Brymbo, $7.50; Wallsend, $6.50.

Foreign Coal Trade. March 26.

Export trade continues very quiet. Some foreign coal is still arriving. It is understood that some representatives of British companies are offering coal at New England points, and are doing some business.

Exports of fuel from Great Britain for the two months ending February 28 were, in long tons:

	1902.	1903.	Changes.
Coal	5,937,729	6,777,156	I. 839,427
Coke	96,313	110,295	I. 13,982
Briquettes	165,095	98,187	D. 66,908
Totals	6,199,137	6,985,638	I. 786,501

In addition to these exports there were 2,578,307 tons of coal sent abroad for use of steamships engaged in foreign trade, against 2,300,375 tons in 1902; an increase of 277,932 tons this year.

Messrs. Hull, Blyth & Co., of Cardiff and London, report under date of March 14 that the general tone of the Welsh coal market is unchanged and prices remain unaltered. Quotations are: Best Welsh steam coal, $3.42@$3.48; seconds, $3.36; thirds, $3.24; dry coals, $3.24; best Monmouthshire, $3.12@$3.18; seconds, $3.06; best small steam coal, $2.16; seconds, $2.04; other sorts, $1.80.

The above prices for Cardiff coals are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½ per cent discount.

The freight market remains very steady, and rates are well maintained. Some rates quoted from Cardiff are: Marseilles, $1.60; Genoa, $1.62; Naples, $1.62; Las Palmas, $1.56; St. Vincent, $1.74; Rio Janeiro, $2.64; Santos, $3; Buenos Aires, $2.16.

IRON TRADE REVIEW.

New York, March 26.

Renewed heavy buying of pig iron has been the feature of the market this week. Foundry iron contracts are being placed for the third and fourth quarters, and some inquiries have been made on orders running into 1904. Southern furnaces are taking a good deal of new business. Basic pig seems to be in demand, as well as foundry. The United States Steel Corporation's order for 140,000 tons from outside furnaces is held off for the present; apparently waiting the result of some negotiations for the purchase of furnace property. The furnaces are reported to be contracting for coke on a basis of $4, Connellsville. In foreign iron less business is being done, as both British and German furnaces are holding for higher prices.

Steel of all kinds is active, especially bars and plates. Structural material is quieter. The mills seem to feel secure of abundant work for the second half of the year, and are generally refusing any concessions.

Reports continue in circulation as to the sale of the Jones & Laughlins Steel Company. It is also reported that the United States Steel Corporation has obtained control of the new Clairton Steel Company, and that it has bought a group of blast furnaces in the Shenango Valley. There has been no confirmation of these rumors as yet, except in the case of the Clairton plant.

Exports of pig iron from Great Britain to the United States for the two months ending February 28 were 69,734 tons, against 9,842 tons in the corresponding period in 1902; an increase of 59,892 tons this year.

Birmingham. March 23.

(*From Our Special Correspondent.*)

There is no iron of the first half of the year's make to be had, but there has not been much buying for the latter part of the year. A number of inquiries have been received by the ironmakers of this district as to

their capacities for the balance of the year. Quotations are being asked for also.

Shipments of iron from the Southern producing territory have been steady, and all furnaces are doing well. The Alabama Consolidated Coal and Iron Company will not blow out Gadsden Furnace until the new furnace at the same place is completed. This furnace has been delayed by the incessant rains. The Shelby Iron Company has one of its two charcoal furnaces at Shelby, Ala., out of blast to permit relining and other improvements. The furnace will hardly resume operation until about the middle of April. The Republic Iron and Steel Company will blow out its No. 2 furnace at Thomas about April 1 for repairs and enlargement. Two stoves are now being put in. As soon as these are finished the furnace will be blown out, and a large force will go to work repairing and enlarging the plant, increasing its capacity to 300 tons a day. As soon as this work can be done the same move will be made with furnace No. 1 at Thomas. The Sloss-Sheffield Steel and Iron Company and the Tennessee Coal, Iron and Railroad Company have one furnace each to blow in shortly.

Quotations are firm and promise to hold their strength now that buying has commenced again. The following prices are noted in Alabama: No. 1 foundry, $19@20; No. 2 foundry, $18.50@$20; No. 3 foundry, $17.50@$18.50; No. 4 foundry, $17@$18; gray forge, $16.50@$17; No. 1 soft, $19@$20.

Finished iron and steel are active in the Birmingham District. The steel plant is doing well. The rolling mills continue to work steadily. The steel mills at Ensley belonging to the Alabama Steel and Wire Company, are busy.

The Empire Plow Company, which purchased the plant of the Austin-Bryan Manufacturing Company, at Ensley, will add machinery for the manufacture of horseshoes and horseshoe nails. Contracts have been let for improvements about the plant.

Chicago. March 23.

(From Our Special Correspondent.)

There is little change in the pig iron market; it continues firm, and business is slowly increasing. Southern continues to be the principal commodity dealt in; Northern furnaces apparently are tightly bound, as regards future business, by the lack of coke. The Northern furnaces, however, are well sold out up to September. Little Northern is in the market, except chance spot lots. Coke continues scarce and high priced; $9.50@$10 is readily obtained for good foundry, while furnace can be had at $9@$10. It is apparent now that no relief in the coke situation is likely for several months. In winter hopes were constantly entertained and expressed that spring would bring relief. The same optimists are now looking hopefully to summer.

It seems also apparent now that the prevalent high prices for both coke and iron are causing users of iron to hold off as long as possible, and to buy for immediate needs as much as obtainable. There is to be no spring boom in the pig iron business, though sellers could hardly wish for better conditions, so far as the good of the trade is concerned. Foundrymen are unquestionably extending their contracts with their customers more than ever before. Some large concerns are reported sold out for a year from the coming midsummer. Industrial alarm clouds are not even visible on the horizon, and trade generally is abnormally good so far as every one locally has to do with the iron business.

Prices continue as last week: No. 2 Northern, $23 @$23.50; No. 2 Southern, $22.85@$23.35, with No. 1 50c. higher and No. 3 50c. lower for both Northern and Southern, on lots corresponding as to size and time of delivery. These prices are for the second half of the year. For speedy delivery premiums range from $2 to $5. There is no cessation of the eager demand for spot lots.

Cleveland. March 24.

(From Our Special Correspondent.)

Iron Ore.—The sales of ore have continued and the contracts to date have been heavy. The shippers are now in position to make arrangements for bringing this material down the lakes, but the boat owners are backward. They believe that the shippers should make the advances, which the latter have refused to do, except in a roundabout way. It is understood that they are willing to pay 85c., Duluth to Ohio ports; 75c., Marquette to Lake Erie, and 70c., Escanaba to Ohio ports. The failure of the dock managers and the longshoremen to come to terms on the rates for handling the ore over the docks is holding up the contracting for transporting the ore.

Pig Iron.—The development of the week has been a better demand for second half material of the foundry grades, linked with a better demand for basic also. The market was generally stirred by the better prospects, and while there were no sales of foundry of any importance the inquiries for the second half are heavy. Transactions for spot shipment are slow, because the material is scarce. The better demand gave the market an upward tendency, but producers are avoiding any advance which might stop the buying, as consumers are not willing to pay any more for the iron than is now being asked. The prices remain for No. 2 Northern foundry, in Southern Ohio, $22, f. o. b. furnace, while the market for the second half is represented by a quotation of $21 to $21.50. Basic for second half delivery is selling well, some of the furnaces having all they can deliver during the third quarter, and others are sold into the fourth quarter. The prices are, for first half, $21.50 to $22, and for second half, $20. Bessemer is quiet, because there are few buyers, and the market is easy. First half material is bringing $21.50@$22, while second half material is quoted at $20.50@$21.

Finished Material.—The structural market has shown weakness that is not easily understood, unless it be said that the spring trade has not fully developed. In this immediate territory there is a lack of new projects that would command any considerable tonnage. The mills in the Pittsburg District are so well caught up on their orders that it is no longer necessary for the consumers to go to the Eastern mills and pay premiums for the needed material, and that feature of the market has been dispensed with. Some sizes are, of course, supplied out of stock at a premium, 2.25c., Cleveland, being obtained; but most of the business is done direct with the larger mills at 1.60c., Pittsburg. Bars are stronger. The agricultural implement works are beginning to buy, although not all of them. The majority are waiting for the Chicago consumers to take the lead. The belief that a concession will be granted has not altogether left the market, but this seems impossible now. The mills are well filled with orders, enough, indeed, to meet present requirements. The contracts closed entail deliveries for the year following the first of July. The price on bessemer steel is $1.60c., Pittsburg. The mills are not making any bid for bar iron, which is variously quoted at between 1.80c., Youngstown, and 1.90c., Youngstown, the average, however, being nearer the general market. Rails are sold in small quantities at $28, Pittsburg, for standard gauge, while light rails are bringing $36, Pittsburg. Plates are strong, but inactive, the mills being too well filled to take on much business. The smaller mills are busy at premiums, 2c. at the mill being obtained. The sheet trade has been lively, with contracts being made freely for the second half of the year, and some of them lapping over into the next year. The prices have not changed, being based on a quotation of 3.10@3.25c. for No. 27 black sheets, out of stock, Cleveland.

Old Material.—The market is firm, with material scarce, and many of the dealers oversold and trying to cover at high prices.

Philadelphia. March 25.

(From Our Special Correspondent.)

Pig Iron.—So far as middle and eastern Pennsylvania are concerned the week has passed without any alarming reports. Notwithstanding the quiet, foundry and forge buyers have manifested a willingness to make liberal purchases if inducements could be extended. Pig iron makers smile at this feature of the case. A number of large consumers have evidently made up their mind to be in no hurry to increase their control over crude iron. Considerable foreign iron is arriving, but negotiations for new stock has been temporarily checked. Importers decline to express themselves with any freedom on this point. There is very little change in quotations over those given for weeks past.

Billets.—According to statements made this week the consumption of billet material has increased, but nearly all consumers are well provided. From quotations given it would appear that billets have been marked up in price, but as no important sales have been made, it is impossible to say whether the nominal advance is actual. Probably it is not.

Merchant Bar.—From reports all over the eastern section of the State since Monday, it appears that a further increase in activity in retail lots is to be noted. Car-builders have recently and very quietly extended their engagements for common iron. It is impossible to find out even approximately what amount of common iron has been contracted for. There is a fair demand in steel bars, and this demand, manufacturers say must increase sharply next month.

Sheet Iron.—Sheet iron sales for the past few days have been for what is called early delivery. Much of this demand has come from iron storekeepers. All small consumers are asking about supplies; two or three inquiries are now under consideration for galvanized, which our people hope to keep from going West. No change in quotations.

Merchant Steel.—We have no news from the mills or their agents this week. No business of importance has been heard of. The only feature of interest is that an enormous amount of merchant steel is going into consumption.

Boiler Tubes.—The consumption of boiler tubes has reached, at least among the smaller shops, what might be considered a maximum point. All our shop capacity is crowded to the very utmost. Locomotive builders, engine builders and makers of all sorts of machinery, wherein tubes enter, have been booking a lot of new business, and they are accordingly looking after supplies of all necessary materials, including tubes.

Pipes.—All manner of merchant pipe is very strong in price, and some recent buyers have found that they have been obliged to pay more for quick delivery.

Plates.—Business in plates has been quiet. This is not the fault of the buyers. The situation is so well known that there is no unnecessary correspondence or negotiation. The subject has been gone over so often, especially between the larger consumers of plates and the mills, that both sides understand each other. The manufacturers as soon as they can shape things up to accommodate their customers let them know. There is no change in quotations.

Structural Material.—The situation remains precisely as it was a week ago, or a month ago. The smaller consumers are considerably disturbed over the probability of getting the material they want, and have ordered to prevent any hitch in their contract work. A peculiar feature of this spring's business is the smallness and the multitude of the orders.

Steel Rails.—The chief interest at present is in girder rails, but it is found impossible to gather much information on this point, or to harmonize conflicting statements made in regard to the amount of business done. The only safe thing to say is that the demand for girder rails this year will probably be double that of last year.

Scrap.—Scrap agents, in obedience to orders from certain large consumers, are scouring around in every nook and corner where scrap in a large way can be had. The usual business is being done in the larger yards. Scrap is by no means plenty, when it comes to railroad, heavy steel or low phosphorus.

Pittsburg. March 24.

(From Our Special Correspondent.)

There is no falling off in the heavy demand and activity in the pig iron market, and it is now impossible to do better than $20, Valley furnaces, for any grade except possibly gray forge, for delivery during the year. There have been some large sales of bessemer within the past few days, and at prices above the $20 quotation. In addition to the sales there are many inquiries which indicate that the blast furnaces of the Pittsburg District and the Valleys will be taxed to their fullest capacity during the rest of the year, even under the most favorable conditions. It was admitted to-day that the negotiations of the United States Steel Corporation with the Bessemer Furnace Association for 140,000 tons of bessemer iron were almost closed last week when something occurred that delayed matters. The amount named is under option, and one reason given for the failure to complete the sale was on account of the probable purchase by the corporation of the three furnaces of the Shenango Furnace Company, located at Sharpsville, Pa. While no official announcement has been made of the transaction, it is confidently believed here that the furnaces have been absorbed. The requirements of the Corporation would be reduced somewhat if it secures these furnaces. A large steel interest east of Pittsburg is in this market for a round lot of bessemer iron, and there is no inducement for furnaces to make any concession in prices in order to get business for this year. It is not improbable that buying for 1904 may soon begin, some inquiries having been made, but prices for extended delivery have not been agreed upon. Basic pig iron has been unusually active during the past few weeks, and some important sales have been made by Valley furnaces to Western steel interests at a minimum price of $20. Some Alabama basic iron has been sold in this market, but the freight rate, $4.65, prevents a heavy business. Virginia basic is quoted here at $21.50. Inquiry for bessemer steel billets and sheet bars is increasing, but there are practically none to be had from the mills here, and prices for foreign steel have advanced so that but little business in crude steel is being done. There is greater activity in all finished lines, and prices are firmer. Heavy sales in plates and wire products continue. The sheet market continues to gain in strength, one of the evidences of the week being the withdrawal by the American Sheet Steel Company of all price concessions on galvanized sheets. This company now quotes net prices on galvanized, the price to large buyers having been 3.60c., but now is 3.85c., and is practically an advance of $5 a ton. An advance in black sheets may be ordered, but this is considered doubtful, as there are many idle mills and a higher price might enable some independent concerns to start their plants that were closed on account of the high price of steel.

The strike of the structural iron workers against the American Bridge Company becomes more serious every day. As indicated in the last report, the company is determined to complete the Wabash bridge

with men not members of the International Association of Bridge and Structural Iron Workers. Several large forces of men have been brought here from different parts of the country during the past few days, probably over 200, but the strikers have succeeded in persuading most of them to desert from the company. An effort was made on Saturday to begin work with a force of 20 men, but the strikers secured 7 of them before anything had been done, and the others were quickly taken back to the quarters provided for them. The company now has two large dwellings fitted up for the accommodation of new men, besides a large barge, which is equipped with bunks, a kitchen and a dining room. The men on the boat are kept afloat, out of reach of the strikers, and can be landed at the bridge when a favorable opportunity presents itself.

The visit of Charles M. Schwab, president of the United States Steel Corporation, to this city, revived a number of rumors, including the probable purchase of the plants and property of the Jones & Laughlins Steel Company. Mr. Schwab left here yesterday, after denying all rumors. There seems to be no doubt that the Corporation has closed a deal for the absorption of the Clairton Steel Company, a subsidiary concern of the Crucible Steel Company of America, and the three furnaces of the Shenango Furnace Company. It is believed that an official announcement of the purchase will be made from New York within the next few days. The Clairton Company owns valuable ore lands, and has three blast furnaces under construction. One is scheduled to be blown in on April 1, another on June 1, and the third on August 1. The steel plant contains twelve 50-ton open-hearth furnaces, ten of which have been in operation since December.

Pig Iron.—Sales of bessemer pig iron during the week aggregated 30,000 tons at prices ranging from $20 to $22, Valley furnaces, according to delivery. One lot of 10,000 tons sold at $20.60, Valley, for delivery in the third quarter. For delivery up to July 1, $21.50@$22, Valley, is quoted, and for the second half from $20 to $20.75 is the price. Basic iron is selling in the Valleys at $20, and this price is considered a low one. Gray forge prices are a trifle firmer, sales for early shipment having been made at $20.75@$21, Pittsburg. For second half, $20@$20.50 is quoted. Foundry No. 2 is quoted at $21.50@$22, Pittsburg, for early shipment, and $21 for late delivery.

Steel.—The scarcity of bessemer steel billets continues, and are quoted nominally at $31, Pittsburg, with open-hearth billets $1 more. German billets are quoted here at $31.75@$32. There is still a heavy demand for plates, and steel bars at the base price of 1.60c., but for early delivery large premiums are paid.

Sheets.—The sheet market has strengthened considerably during the week, and the American Sheet Steel Company has withdrawn all concessions on galvanized sheets. It has just been developed that a reduction from quoted prices of $5 a ton had been allowed large buyers. Galvanized sheets are now 3.85c. for No. 28 gauge, and black sheets continue at 2.75c.

Ferro-manganese.—There is no change in the market. No domestic is being sold and the foreign product is held at $52@$53.

New York. March 26.

Pig Iron.—The market is still quiet, with buying mostly in small lots for immediate use. We quote for early delivery, Northern irons at tidewater: No. 1X foundry, $23.25@$23.75; No. 2X, $22.25@$22.75; No. 2 plain, $21.25@$21.75. For Southern iron on dock, New York: No. 1 foundry, $23.75; No. 2, $22.75; No. 3, $21.75.

Bar Iron and Steel.—We continue to quote for large lots on dock: Refined bars, 1.95@2c.; soft steel bars, 1.80@1.90c.

Plates.—Eastern mills have reduced prices, which are for tidewater delivery in car-loads: Tank, ¼-in. and heavier, 1.90c.; flange, 1.95c.; marine, 2.05c.

Steel Rails.—Standard sections are still quoted at $28, f. o. b. mills for 1903 delivery; light rails, $30 @$36, according to weight. Relaying rails are $28@$30 for heavy sections and $33@$35 for light sections.

Structural Material.—Demand continues fairly strong. We quote for large lots at tidewater: Beams, angles, channels and tees, 1.75@2c.

Cartagena, Spain. March 7.

(*Special Report of Barrington & Holt.*)

Iron and Manganiferous Ores.—Recent shipments include two cargoes, 6,020 tons dry ore, to Great Britain.

Several new contracts have been made for forward delivery at considerably higher prices than those paid lately for old cargoes. Calasparra iron ore is in brisk demand, but there are no available stocks for prompt shipment. Several sales have been made at an increased price of 6d. to 9d. per ton one previous prices.

Prices are firm at 6s. 9d.@7s. per ton, f. o. b. shipping port, for ordinary 50 per cent ore; 7s. 3d.@7s. 9d. for special low phosphorus; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. for lump and 9s. 6d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese and 20 iron, to 9s. 9d. for 12 manganese and 35 iron.

Pyrites.—Iron pyrites, 43 per cent sulphur and 40 per cent iron, are quoted at 10s. 6d. per ton. No shipments are reported for the week.

Other Shipments.—Other shipments include 30,000 kgs. ocher to London.

CHEMICALS AND MINERALS.

(See also prices-current on page 508.)

New York, March 25.

Manufacturers of heavy chemicals in this country will be interested to learn that the progress they are making has not only been reflected in the decreasing imports, but is also felt by the British combination, the United Alkali Company. This concern was for many years our chief source of supply of such heavy chemicals as alkali, caustic soda, bleaching powder and chlorate of potash. From 1892 to 1898, the year when the American import duties aggravated the situation which had already become serious by the introduction of electrolytic methods at competitive plants in Europe, the gross profits of the United Alkali Company fell off about 59 per cent. Since 1898, though there has been some improvement, profits are still comparatively small, and in 1902 were 53 per cent less than 1892. In fact, during the 12 years of its existence the United Alkali Company has paid only about 19 per cent on its ordinary shares. It could pay only 7 per cent annually on the preferred stock and 5 per cent on the debentures after providing out of profits for the maintenance of plant, etc. Briefly, the combination is over-capitalized at $30,000,000 stock and $12,500,000 bonds. A few years ago an attempt was made to recoup some of the trade which had been lost in the United States, and works were built in Michigan, but up to the present only chlorate of potash has been manufactured.

At a recent meeting the National Lead Company made its charter perpetual, and widened its scope, permitting the operation of mines and metallurgical works, the manufacture of lead pigments, etc., and of pyroligneous acid, acetate of lime, and charcoal by the process of destructive distillation, carbon dioxide, magnesia and the products thereof, and also the preparation of vegetable and mineral oils and products of same. Privilege is given to become interested in other corporations, which appears to be the preliminary move towards forming a consolidation with other manufacturers of lead products. The company has also provided to redeem its preferred stock at par and accrued unpaid interest after three years from the date of issue. At present $14,904,000 preferred stock is outstanding, upon which dividends of $13,187,708 have been paid at the rate of 7 per cent annually.

The American Agricultural Chemical Company intends to strengthen its position by absorbing the Bowker Fertilizer Company, a keen competitor. This explains in part the application of the company to the New York Stock Exchange recently to list an additional $1,000,000 preferred stock, and $500,000 common. Judging from its earnings since incorporation the American Agricultural Chemical Company has not realized the profits which were at first expected. Higher cost of raw materials is one of the reasons given, but it is believed that more money will be made from now on as the Peace River phosphate mines in Florida, which are owned by the company, are producing about 10,000 tons a month, which can be increased to 150,000 tons a year. It is understood that the company has heretofore paid too high a price for its phosphates, as it signed long-time contracts for supplies.

Zinc Skimmings.—Recently there has been quite a large export trade, 219,080 lbs. being shipped to Great Britain. These exports had an average invoice value of a little over 2c. per lb.

Cyanide of Potassium.—Consumption is regular, and a fair export trade is being done with Mexico and South America. Prices continue low, and although 20@20½c. per lb., f. o. b. New York, is quoted, less can doubtless be done.

Bleaching Powder and Chlorine.—Trade is quiet, and prices unchanged as follows: Domestic bleach, $1@$1.12½ per 100 lbs., f. o. b. works; foreign, $1.20@$1.25, f. o. b. New York, for future shipments, and $1.37½@$1.62½ for early deliveries. Liquid chlorine, imported from Germany, is held at 30c. per lb., f. o. b. New York, and chlorine water, 10c.

Talc.—Domestic talc, particularly of Southern production, where floods have interfered with work at the mills, is strong, and sellers are less inclined to shade prices. Imports are also limited. Quotations for first-grade North Carolina talc are $18 per short ton; French best, $1.25 per 100 lbs., and Italian best, $1.62½ per 100 lbs.

Barytes.—Persistent efforts are being made by the combination to keep the domestic production, which now amounts to about 50,000 short tons per annum, down to a point where better market prices may be maintained. It is a difficult proposition, as outside producers, though owning small mines, are aggressive competitors. Besides, importers of German barytes are also exerting themselves. Just now imports are limited by the advancing ocean freight rate, but this is only a temporary check to shading prices to good customers. Quotations on imported barytes vary from $14.50@$17 per ton, according to quality, while the crude domestic mineral is held at $9 per ton for No. 1, $8 for No. 2, and $7.75 for No. 3.

Mica.—Rumors of a plan to consolidate the mica mines of Canada, which are not in the control of Americans, are interesting the trade, but more substantial reports will have to be issued before any credence will be given to the scheme. It is noteworthy, however, that while Canada produced approximately $400,000 worth of mica last year, a large part of it has been exported to consumers in the United States and England. It is true that some Americans are interested in the mica mines of Quebec, but the fact should not be overlooked that the largest producer is a Canadian firm, with headquarters at Ottawa.

Brimstone.—Weakness characterizes this market, notwithstanding the reports of firmer prices abroad. It appears that the heavy imports lately have created stocks here that are too large to carry advantageously, and so holders are compelled to sell at the best price offered. Spot best unmixed seconds have been sold down to $22 per ton, which is the lowest price in a long while. Shipments are quoted at $22.25@$22.50. Best thirds are nominally $1 less than seconds, but as this grade is not imported in any large quantity, the market for it is uninteresting. The Anglo-Sicilian Sulphur Company has just declared an interim dividend on the preference shares at the rate of 6 per cent per annum for the half year ended January 31, 1903.

Imports of brimstone into Great Britain in February were 1,201 long tons, making 2,999 tons for the first two months this year, as compared with 4,306 tons in the corresponding period last year; showing a decrease of 1,307 tons, or about 30 per cent. This falling off contrasts with an increase of over 13 per cent in the imports of pyrites.

Sicilian Brimstone Market.—Messrs. Emil Fog & Sons, of Messina, inform us that the market in February was firm, and that the demand from vine growing countries is now taxing the full capacity of the mills and refineries at Catania. Production in Sicily in 1902 was 496,300 tons, against 547,900 tons in 1901, the decrease of 51,600 tons being due to the November floods, which inundated several mines. Proprietors are exerting great efforts to increase their production, while the Anglo-Sicilian Sulphur Company tries to keep it down. Prices of seconds have scarcely moved in the last six months, while thirds have improved about 5s. The antiquated methods of fusing sulphur ore, using part of the ore as fuel, are being replaced by modern methods which improve quality as well as quantity. Consequently, production of seconds is increasing while thirds are getting scarcer. Lower prices are not expected until arrival of the new fusion in June—July. We quote per ton, f. o. b., as follows: Best unmixed seconds, in bulk, 83s. 3d.; best thirds, 79s. 3d.; current thirds, 78s. 9d.; refined block sulphur, 87s. 3d.; refined roll sulphur, 98s.@104s. 9d.; sublimed flowers, pure in bags, 105s. 6d.; sublimed flowers, current, in bags, 98s. 3d. Freights to New York are 7s.; Boston, Baltimore, Portland, 7s. 6d.; Philadelphia, 8s.; Canadian ports, whole steamers, 8s. 6d.; ballast lots to Montreal, 10s.@14s., according to quantity.

Pyrites.—Importers are now obliged to pay higher ocean freight rates from Spain, the latest charters being on a basis of 11s. 6d. ($2.76). This indicates that the freight market is strengthening to the position held in late January, when as high as 12s. 6d. ($3) was paid. No change has yet been made in prices for pyrites, as deliveries are being made on long time contracts. Lately there has been an increase in the importation of cupriferous ore, which carries from 1½ to 2 per cent copper in the cinder that can be marketed at the advancing prices for that metal. No decrease is noted, however, in the imports of iron pyrites, as this ore satisfies the bulk of the trade.

We quote for domestic pyrites, $5 per ton for lump ore, f. o. b. mines, and 10c. per unit for fines; sulphur content varies from 42 to 44 per cent. Spanish pyrites, carrying from 46 to 52 per cent sulphur, are quoted at 12 to 13c. per unit for lump, and 10 to 11c. for fines, delivered at New York and other Atlantic ports.

Imports of copper and iron pyrites into Great Britain in February amounted to 55,808 long tons, showing a falling off as compared with January, but recording an increase over February, 1901. In the

two months ending February 28 the imports were as below, in long tons:

	1902.	1903.	Changes.
Pyrites	111,301	125,897	I. 14,296
Sulphur content	52,311	59,162	I. 6,851

The increase this year is equal to over 13 per cent. The average invoice value of the pyrites was about $8.20 per ton, which is 30c. less than 1901. At this ratio the cost of the sulphur recovered is much less than crude brimstone imported from Sicily.

Nitrate of Soda.—The heavy deliveries in January and February, coupled with the partial loss of one large cargo in March, and the delayed arrivals, the position of the market here has been strengthened materially. Importers are practically without stocks at present, which has urged dealers who have supplies to raise prices. Spot goods are held at $2.25 per 100 lbs.; nearby arrivals at $2.15@$2.20, and futures at $1.87½ to $2, according to position. Ocean freight rates from Chile are firmer.

Chilean Nitrate of Soda Market.—Messrs. Jackson Brothers, of Valparaiso, write us under date of February 7, as follows: There has been a considerable reduction in prices, transactions being made for February delivery at 6s. 6½d.@6s. 3½d. Sellers have offered their production freely all during the fortnight, and only finding buyers at 6s. 3½d., alongside, for near deliveries during the last 2 days, at which a fair business has been done. We have to report only one sale for April—December delivery at 6s. 3d., alongside, and another for September, at 6s. 4d. We quote February—March, 6s. 3d.; April, 6s. 2½d.; May—June, 6s. 2d., all ordinary terms sellers. Refined quality is offered at 6s. 7½d. for February—March delivery. The price of 6s. 3d. per qtl., with an all-round freight of 12s. 6d. per ton, stands in 7s. 7d. per cwt., net cost and freight, without purchasing commission. Total sales for the fortnight ending February 5, 448,000 qtls., and resales, 88,000 qtls.

Sulphate of Ammonia.—Gas liquor is steadier, early deliveries of 24 to 25 per cent quality bringing $3.15@$3.17½ per 100 lbs., f. o. b. New York, while future shipments are obtainable at $3.12½@$3.15.

Acids.—Demand on contract is moderate, though sulphuric acid shows an improvement.

Quotations per 100 lbs. are as below, unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic com'l...	$5.25@$5.50
Muriatic, 20°..	1.60	Sulphuric, 50°, bulk, ton....	13.50@14.50
Muriatic, 22°.	1.75	Sulphuric, 60°.	1.05
Nitric, 36°....	4.37½	Sulphuric, 60°, bulk, ton	18.00@20.00
Nitric, 38°....	4.75	Sulphuric, 66°,	1.20
Nitric, 40°....	5.00	bulk, ton	21.00@23.00
Nitric, 42°....	5.37½		

Copper Sulphate.—This article is in a particularly strong position, as there are few sellers even at $5.50 @$5.75 per 100 lbs., f. o. b. New York or Baltimore. The fact is that the output has been curtailed to a notable extent; last year it fell off fully 38 per cent as compared with 1901. True, exports declined about 36 per cent in 1902—an important fact considering that over 60 per cent of our production is annually consumed by the vineyards of Europe and elsewhere. But there are indications that our domestic consumption—for electrical purposes and as an insecticide—is steadily increasing. Furthermore, experience has shown that better prices are obtained on domestic trade than on foreign shipments. In the first two months of the present year the exports through the port of New York alone had an average invoice value of $3.48 per 100 lbs., while the regular market quotation averaged much more. Another explanation of our decreasing export trade is that Great Britain is conquering our foreign markets by selling a higher grade article, and making deliveries as promptly as required. In the two months ending February 28, Great Britain exported 26,736,640 lbs. copper sulphate, which compares with 11,755,520 lbs. in the corresponding period last year. This increase in 1903 is equal to 14,981,120 lbs., or about 128 per cent. The average c. i. f. price of this year's exports from Great Britain was equivalent to $4.09 per 100 lbs., which is 37c. less than 1901. Compared with the American export price it is somewhat higher.

Phosphates.—Buying for European account is on the increase, especially for the higher grade phosphates, and as ocean freight rates are stronger, better prices are being booked by exporters. As yet, however, exports are not as large as last year, but it is expected that a big business will be done from now until after the summer season.

Shipments of land pebble phosphates from Tampa, Fla., in January and February amounted to 24,335 tons, which shows a falling off as compared with the corresponding period in 1902. Exporters of this grade phosphate are now paying $3.33 ocean freight to the Continent, where they find their best foreign market. High-grade rock obtains a $2.58 rate from Fernandina, Fla., to Rotterdam, Holland—a leading market.

Acid phosphates are selling at 55 to 65c. per unit.

Imports of phosphates into Great Britain in the two months ending February 28 were 59,928 long tons, against 59,442 tons in the same time in 1902. The value of this year's imports averaged $6.96 per ton, which is $1.17 less than 1902, indicating heavier receipts of the lower grade phosphates.

Phosphates	Per ton F. o. b.	United Kingdom or European Ports. Unit.	Long ton.
*Fla. hard rock (78@80%)..	$6.00@$6.50	6¾@6½d.	$9.88@10.27
*Fla. land peb. (68@73%)..	3.00@ 3.25	5½@5¾d.	7.70@ 8.05
†Tenn., (78@82%) export..	3.75@ 4.00	6⅛@6⅜d.	9.80@10.20
†Tenn., 78% domestic.....	3.25@ 3.50	.....	.....
†Tenn., 75% domestic.....	3.00@ 3.25	.....	.....
†Tenn., 73@74% domestic...	2.50@ 275	.....	.....
†Tenn., 70@72% domestic...	2.25@ 2.50	.....	.....
‡So. Car. land rock.....	....@ 3.25	.....	.....
‡So. Car. river rock.....	2.75@ 3.00	4¾@5¼d.	5.40@ 6.09
Algerian (63@70%)	.....	5@5¾d.	6.60@ 7.59
Algerian (58@63%)	.....	4¾@5½d.	5.70@ 6.60
Gafsa (Tunis)	.....	4¾@5⅝d.	5.32@ 6.02

* Fernandina, Brunswick or Savannah.
† Mt. Pleasant. ‡ On vessels, Ashley River.

Liverpool. March 10.

(*Special Report of Joseph P. Brunner & Co.*)

The market for most lines of heavy chemicals continues steady, but there is not much activity to report as regards fresh business, the bulk of the deliveries being against running contracts.

Following are the exports of bleaching powder and sodas for February, as taken from the Board of Trade returns:

Bleaching powder to United States, 79,747 cwts.; other countries, 20,692; total, 100,439 cwts.; Soda ash, 149,465 cwts.; caustic soda, 95,290; bicarb. soda, 52,750; soda crystals, 9,525; sodium sulphate, 76,049; other sorts, 21,663; total, 384,742 cwts.

These shipments show a considerable increase over February, 1902. Evidently buyers have drawn pretty heavily last month against contracts, as the new business reported has mostly been on a moderate scale.

Soda Ash is firm for tierces, as follows: Leblanc ash, 48 per cent, £5 15s.@£6; 58 per cent, £6 2s. 6d.@£6 7s. 6d. per ton, net cash. Ammonia ash, 48 per cent, £4 5s.@£4 10s.; 58 per cent, £4 10s.@£4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces.

Soda Crystals continue steady at £3 7s. 6d. per ton, less 5 per cent for barrels, or 7s. less for bags, with special terms for a few favored markets.

Caustic Soda is in good demand, and held for full prices. We quote: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 74 per cent, £10 5s.; 76 per cent, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters.

Bleaching Powder is almost unsaleable, buyers being mostly filled up on contracts over the year. Prices are nominal at about £4@£4 5s. per ton, net cash for hardwood packages.

Chlorate of Potash is quiet, but quotations are steady at 2⅞@3d. per lb., net cash.

Bicarb. Soda is in request at £6 15s. per ton, less 2½ per cent, for the finest quality in 1-cwt. kegs, with usual allowances for larger packages, also special quotations for a few favored markets.

Sulphate of Ammonia has taken a sharp turn for the better, and a large business is reported this week. Quotations have advanced to £12 17s. 6d.@£13 per ton for good gray 24@25 per cent in double bags, f. o. b. here.

Nitrate of Soda is in request and dearer, holders now quoting £9 10s.@£9 12s. 6d. per ton, less 2½ per cent, for double bags, f. o. b. here, spot delivery.

METAL MARKET.

New York, March 26.

Gold and Silver Exports and Imports.

At all United States Ports in February and Year.

Metal	February. 1902.	February. 1903.	Year. 1902.	Year. 1903.
Gold:				
Exports....	$8,665,480	$1,506,370	$10,639,155	$1,583,513
Imports....	1,696,967	1,771,758	3,102,754	3,559,606
Excess.	E. $6,968,513	I. $265,388	E. $7,536,401	I. $1,976,092
Silver:				
Exports....	$3,926,585	$3,806,514	$8,450,595	$7,443,930
Imports....	2,005,643	1,687,009	4,113,324	3,580,972
Excess.	E. $1,920,942	E. $2,179,505	E. $4,337,271	E. $3,862,958

These figures include the exports and imports at all United States ports, and are furnished by the Bureau of Statistics of the Treasury Department.

Gold and Silver Exports and Imports, New York.

For the week ending March 25, and for years from January 1:

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.	Total Excess, Exports or Imports.
Week ...	$ 36,400	$14,023	$642,251	$52,724	E. $611,904
1903.....	1,284,951	2,094,853	4,967,846	331,454	E. 3,830,498
1902.....	13,839,695	808,541	9,400,999	328,256	E. 22,103,880
1901.....	9,279,965	778,886	9,127,909	1,025,669	E. 16,603,326

Exports were principally to London; imports mostly from the West Indies and South America.

Financial Notes of the Week.

Business generally continues good, though the speculative markets are rather dull. General trade, however, is paying little attention to Wall Street just now.

The statement of the New York banks, including the 59 banks represented in the Clearing House, for the week ending March 21, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts.	$910,779,100	$912,935,100	$911,547,400
Deposits	1,000,458,300	973,234,600	900,682,400
Circulation	31,525,100	31,434,500	42,863,500
Specie	188,488,300	176,832,400	163,592,500
Legal tenders	71,898,700	69,947,500	64,758,500
Total reserve	$260,387,000	$246,779,900	$228,351,000
Legal requirements	250,114,575	243,308,650	225,170,600
Balance surplus	$10,272,425	$3,471,250	$3,180,400

Changes for the week, this year, were an increase of $2,156,400 in surplus reserve, and decreases of $12,953,000 in loans and discounts, $15,479,600 in deposits, $74,000 in circulation, $1,155,300 in specie, and $558,200 in legal tenders.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison made with the holdings at the corresponding date last year:

	1902. Gold.	1902. Silver.	1903. Gold.	1903. Silver.
N. Y. Ass'd.	$176,832,400	.....	$163,592,500	.....
England	187,766,140	.....	185,680,205	.....
France	509,104,515	$221,240,090	505,261,890	$219,701,155
Germany ...	194,370,000	71,890,000	168,650,000	62,375,000
Spain	70,305,000	90,065,000	72,240,000	99,660,000
Neth'l'ds ..	26,931,000	32,778,500	20,537,000	32,935,000
Belgium ...	15,620,000	7,810,000	15,793,335	7,896,665
Italy	80,375,000	10,640,000	87,630,000	10,916,000
Russia	379,430,000	37,860,000	394,730,000	41,145,000

The returns of the Associated Banks of New York are of date March 21, and the others March 19, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market continues steady, with good undertone from India. The advance statements from our Government indicate probability of the purchase in the near future of 2,000,000 oz. silver bullion per month on account of Philippine coinage. This action should cause a slight improvement in the price of silver.

The United States Assay Office in New York reports receipts of 36,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to March 12 are reported by Messrs. Pixley & Abell's circular, as follows:

	1902.	1903.	Changes.
India	£1,607,585	£1,668,900	I. £61,315
China	16,500	106,500	I. 90,000
The Straits	250	128,491	I. 128,241
Total	£1,624,335	£1,903,891	I. £279,556

Receipts for the week were £95,000 in bar silver from New York, £3,000 from Chile, £14,000 from Cape Colony, and £3,000 from New Zealand; total, £115,000. Shipments were £123,000 in bar silver to Bombay and £5,000 to Madras; total, £128,000.

Indian exchange is unchanged, and the Council bills offered in London were all taken at an average of 16.03d. per rupee. Silver for Indian account is being bought rather more freely.

The foreign merchandise trade of Great Britain for the two months ending February 28 is valued by the Board of Trade returns as follows:

	1902.	1903.	Changes.
Imports	£91,822,939	£86,787,100	D. £5,035,839
Exports	56,725,997	59,885,118	I. 3,159,121
Excess, imports ..	£35,096,942	£26,901,982	D. £8,194,960

The gold and silver movement for the two months is reported as follows:

	1902.	1903.	Changes.
Gold:			
Imports	£2,661,502	£3,683,601	I. £1,022,099
Exports	1,018,708	2,238,557	I. 1,219,849
Excess, imports	£1,642,794	£1,445,044	D. £197,750
Silver:			
Imports	1,646,618	1,649,585	I. 2,967
Exports	1,760,760	1,984,171	I. 223,411
Excess, exports	£114,142	£334,586	I. £220,444

Of the silver imported this year, £1,458,811, or 88.4 per cent of the total, is credited to the United States.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$ 38¼	$ 40¼
Peruvian soles and Chilean pesos	.36	.39
Victoria sovereigns	4.85	4.88
Twenty francs	3.86	3.88
Twenty marks	4.74	4.80
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

March.	Silver—Sterling Exchange	Silver—N. Y. Cts.	Silver—London, Pence.	Copper—Lake, Cts. per lb.	Copper—Electrolytic, Cts. per lb.	Copper—London, £ per ton.	Tin, Cts. per lb.	Lead Cts. per lb.	Spelter—N. Y. Cts. per lb.	Spelter—S. L. Cts. per lb.
				15	14⅞			4.60		
19	4.87	48⅛	22 5/16	@15½	@15	66¼	29⅜	@4.65	5.57½	5.40
				15	14⅞			4.60		
20	4.87	48½	22⅜	@15¾	@15	66⅜	29½	@4.65	5.57½	5.40
				15	14⅞			4.60		
21	4.87	48½	22⅜	@15¾	@15	....	29⅜	@4.65	5.57½	5.40
				15	14¾			4.60		
23	4.87	48½	22⅜	@15½	@15	66½	29½	@4.65	5.62½	5.45
				14⅞	14¾		29¾	4.60		
24	4.87½	48½	22½	@15½	@14⅞	65½	@29¾	@4.65	5.62½	5.45
				14⅞	14¾		29¾	4.60		
25	4.8690	48⅝	22 7/16	@15⅝	@14⅞	63¾	@29½	@4.65	5.62½	5.45

London quotations are per Long Ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars; the price of electrolytic cathodes is usually 0.25c lower than these figures

Copper.—After the feverish activity of the last few months there has at last come a lull, and the market has ruled very quiet indeed throughout the week. The sudden decline in the London speculative market has caused consumers to restrict their purchases for the time being. Under the circumstances, quotations at the close are rather nominal at 14⅞@15⅛c. for Lake; 14¾@14⅞c. for electrolytic copper in ingots, cakes and wirebars; 14½@14⅝c. in cathodes; 14⅝c. for casting copper.

The market for standard copper in London, which closed last week at £66 7s. 6d., opened on Monday at £66 2s. 6d., declined about 15s. on Tuesday, and the closing quotations on Wednesday are cabled as £63 12s. 6d.@£63 15s. for spot, £63 10s.@£63 12s. 6d. for three months.

Refined and manufactured sorts we quote: English tough, £67@£68; best selected, £69@£70; strong sheets, £77 10s.@£78 10s.; India sheets, £73@£74; yellow metal, 6¼@6⅝d.

Exports of copper from Atlantic ports in the week ending March 24 are reported by our special correspondents as follows: Great Britain, 1,015 long tons; Germany, 1,088; Holland, 600; France, 1,401; Denmark, 15; Sweden, 85; Russia, 185; Argentina, 1; Panama, 48; total, 4,438 tons. Imports of copper were 77 tons from Germany, 301 tons from Great Britain, 50 tons from France, and 25 tons from Mexico; total, 453 tons.

Imports and exports of copper in Great Britain for the two months ending February 28 were as follows, in long tons; the totals giving the approximate quantity of fine copper:

	1902.	1903.	Changes.
Copper ore	20,920	16,948	D. 3,972
Matte and precipitate	14,201	10,665	D. 3,626
Fine copper	19,125	8,155	D. 10,970
Total, fine copper	28,363	15,183	D. 13,180
Exports, fine copper	8,249	9,043	I. 794
Balance	20,114	6,140	D. 13,974

Of the imports this year, 88 tons ore, 876 tons matte and 2,444 tons fine copper were from the United States; against 85 tons ore, 4,160 tons matte and 12,091 tons fine copper last year.

Tin has been rather neglected throughout the week, and the market has been dull and depressed, consumers manifesting very little interest in the article. At the close, we quote spot and futures at 29⅜@29½c.

The foreign market, which closed last Friday at £134 10s., opened on Monday at the same quotation, declined on Tuesday to £133 15s., but closes on Wednesday at £134 10s.@£134 12s. 6d. for spot, £134 15s.@£134 17s. 6d. for three months.

Imports of tin into Great Britain for the two months ending February 28, with re-exports of foreign tin, were as follows, in long tons:

	1902.	1903.	Changes.
Straits	3,570	3,223	D. 347
Australia	589	736	I. 147
Other countries	758	414	D. 344
Total imports	4,917	4,373	D. 544
Re-exports	2,970	3,771	I. 801
Balance	1,947	602	D. 1,345

Lead.—The market is without any special feature. The ruling quotations are 4.60@4.65c., New York; 4.52½@4.57½c., St. Louis.

The foreign market is easier, Spanish lead being quoted at £13@£13 2s. 6d.; English lead, 2s. 6d. higher.

Imports and exports of lead in Great Britain for the two months ending February 28 were as follows, in long tons:

	1902.	1903	Changes.
United States	9,903	5,419	D. 4,484
Spain	16,664	15,261	D. 1,403
Australia	11,856	11,507	D. 349
Other countries	1,949	2,976	I. 1,027
Total imports	40,372	35,163	D. 5,209
Exports	5,530	4,186	D. 1,344
Balance	34,842	30,977	D. 3,865

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of March 7 that the price of silver for the week has been 11.75 reales per ounce. Exchange has gone down 5 centimos, making it 33.70 pesetas to £1. The local quotation for pig lead on wharf has been 66 reales per quintal, which, on above exchange, is equal to £10 19s. 3d. per ton of 2,240 lbs., f. o. b. Cartagena. Exports of pig lead have been 711,887 kgs. to London; 361,332 kgs. to Marseilles; a total of 1,072,219 kgs. There were also shipped 369 kgs. silver bars to Marseilles.

Spelter has experienced another sharp advance, and we understand that large quantities have changed hands. At the close we quote St. Louis at 5.45c.; New York, 5.62½c.

The foreign market, which has ruled very firm indeed for some time past, broke suddenly on Wednesday, the closing quotations being £22 10s. for good ordinaries, £22 15s. for specials.

Imports of spelter into Great Britain for the two months ending February 28 were 14,360 long tons, against 12,901 tons for the corresponding period in 1902; an increase of 1,459 tons.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of March 7, that ore is in good demand, and prices are advancing. Shipments for the week were 3,700 tons blende to Antwerp.

Antimony has been in somewhat better demand. The ruling quotations are: Cookson's, 8¼c.; Hallett's, 6¾@6⅞c.; Hungarian, Italian, United States, Japanese and French, 6½@6⅝c.

Nickel.—The price is now quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings $19 per oz. in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 72½c. per gram.

Quicksilver.—The New York price is $47 per flask for large lots, with a slightly higher figure quoted for small orders. The San Francisco quotation is $44.50@$46 per flask for domestic orders, and $42@$43 for export. The London price is £8 12s. 6d. per flask, with the same quotation from second hands.

Imports of quicksilver into Great Britain for the two months ending February 28 were 804,168 lbs., against 433,835 lbs. in the corresponding period in 1902. Re-exports were 360,780 lbs., against 354,861 lbs. last year.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

	Per lb.
Aluminum.	
No. 1, 99% ingots	33@37c.
No. 2, 90% ingots	31@34c.
Rolled Sheets	4c. up
Alum-bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Chromium, pure (N.Y.)	80c.
Copper, red oxide	50c.
Ferro-Molyb'um (50%)	$1.25
Ferro-Titanium (10%)	90c.
Ferro-Titanium (20@25%, N. Y.)	55c.
Ferro-Tungsten (37%)	28c.
Magnesium	$2.75
Manganese, pure (N.Y.)	60c.
Mangan'e Cop. (20% Mn)	32c.
Mangan'e Cop. (30% Mn)	38c.
Molybdenum (Best)	$1.82
Phosphorus	45c.
American	70c.
Sodium metal	50c.
Tungsten (Best)	62c.

Missouri Zinc Ore Market. March 21.

(From Our Special Correspondent.)

The assay basis price of zinc has advanced in two weeks from $33.50 to $37 per ton for ore assaying 60 per cent zinc, two bins of 64 per cent zinc selling during the past week at $41 per ton. The movement of the smelter men to lower the price at the beginning of the winter, when the producers were forced to export 1,000 tons of ore to relieve the pressure of a reserve stock of 11,000 tons, and to adopt a plan of curtailing the output for two weeks, by which combination of maneuvers the reserve stock was cut down to 5,000 tons during December, has reacted on the smelter men. Prices were reduced at a time of year when a certain per cent of the mines are closed through force of circumstances, and before the reserve stock could be recruited a disagreeable winter, not cold, but sloppy, with bad roads, was upon the district. Although the reserve stock was raised to about 8,000 tons first, a car shortage, still prolonged, and the worst roads the district has known for many years, resulted in preventing the smelter men accumulating a safe reserve stock. Inability to secure either Western or Wisconsin ore at this season of the year has placed the zinc ore market wholly in the hands of the producers of the Joplin District. The whole condition was brought about by the short-sightedness of price reductions at the beginning of winter. It will be late in the spring before the output of the district can be restored to a normal condition, as a rainy spring has followed a wet winter, and many mines are full of water. To make matters worse a shortage of coal in the midst of a very wet spell prevented most of the mines at any distance from the railroads securing fuel, thereby stopping pumps. The water gained such headway that the pumps were pulled from a number of mines. The district is to-day outputting at its limit, and this limit will be increased very slowly for a couple of months.

Lead concentrates continued to sell the past week at $58.50 per ton, the high price reached the previous week. A year ago lead sold at $43.50, and zinc at $34 per ton, an advance of $7 for zinc and $15 for lead. For 12 weeks of this year lead has averaged $10 and zinc $5 per ton higher than during the same period of last year.

Following are the shipments of zinc and lead ores from the various camps of the Joplin District for the week ending March 21, 1903:

	Zinc. Pounds.	Lead. Pounds.	Total. Value.
Joplin	3,468,240	277,110	$68,799
Carterville-Webb City	1,896,870	347,750	43,38
Galena-Empire	974,030	127,740	20,195
Carthage	704,950	.....	13,394
Duenweg	506,920	23,940	9,825
Granby	454,000	50,000	8,938
Carl Junction	393,000	.....	7,448
Prosperity	303,510	11,650	5,503
Aurora	324,160	.....	4,475
Central City	238,330	12,230	4,034
Cave Spring	183,920	3,450	3,596
Spurgeon—Spring City	260,540	28,250	3,428
Oronogo	165,130	17,370	3,399
Zincite	182,770	.....	3,290
Mitchell	151,370	3,820	2,987
Alba	48,780	.....	814
Totals	10,256,540	903,310	$203,814
Totals 12 weeks	105,963,970	12,069,680	$1,988,315

Zinc value the week, $176,390; lead value, $27,424. Zinc value, 12 weeks, $1,678,947; lead value, $319,268.

Average Prices of Metals per lb., New York.

Month.	Tin. 1903.	Tin. 1902.	Lead. 1903.	Lead. 1902.	Spelter. 1903.	Spelter. 1902.
January	28.33	23.54	4.075	4.000	4.865	4.27
February	29.43	24.07	4.075	4.075	5.043	4.15
March	....	26.32	....	4.075	....	4.28
April	....	27.77	....	4.075	....	4.37
May	....	29.85	....	4.075	....	4.47
June	....	29.36	....	4.075	....	4.96
July	....	28.38	....	4.075	....	5.27
August	....	28.23	....	4.075	....	5.44
September	....	26.60	....	4.075	....	5.49
October	....	26.07	....	4.075	....	5.38
November	....	25.68	....	4.075	....	5.18
December	....	25.68	....	4.075	....	4.78
Year	....	26.79	....	4.069	....	4.84

Note.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.; for February, 4.861c.

Average Prices of Copper.

Month.	New York Electrolytic. 1903.	New York Electrolytic. 1902.	New York Lake. 1903.	New York Lake. 1902.	London Standard. 1903.	London Standard. 1902.
January	12.159	11.053	12.361	11.322	53.52	48.43
February	12.778	12.173	12.901	12.378	57.34	55.16
March	.....	11.882	.....	12.188	....	53.39
April	.....	11.618	.....	11.986	....	52.79
May	.....	11.856	.....	12.226	....	54.03
June	.....	12.110	.....	12.360	....	53.93
July	.....	11.771	.....	11.923	....	52.89
August	.....	11.404	.....	11.649	....	51.96
September	.....	11.480	.....	11.760	....	52.68
October	.....	11.449	.....	11.722	....	52.18
November	.....	11.288	.....	11.533	....	51.03
December	.....	11.430	.....	11.599	....	50.95
Year	.....	11.626	.....	11.887	....	52.46

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Month.	1903. London. Pence.	1903. N. Y. Cents.	1902. London. Pence.	1902. N. Y. Cents.	1901. London. Pence.	1901. N. Y. Cents.
January	21.98	47.57	25.62	55.56	28.97	62.82
February	22.11	47.80	25.41	55.09	28.13	61.06
March	....	....	25.00	54.23	27.04	60.63
April	....	....	24.34	52.72	27.30	59.29
May	....	....	23.71	51.31	27.43	59.64
June	....	....	24.17	52.36	27.42	59.57
July	....	....	24.38	52.88	26.96	58.46
August	....	....	24.23	52.52	26.94	58.37
September	....	....	23.88	51.52	26.95	58.26
October	....	....	23.40	50.57	26.62	57.59
November	....	....	22.70	49.07	26.12	56.64
December	....	....	22.21	48.03	25.46	55.10
Year	....	....	24.09	52.16	27.11	58.95

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Name of Company.	Date.	Per Share.	Total.	Total to Date.
Acacia, Colo.	April 1	.01	$14,339	.....
§Am. Agric. Chem., pf.	April 1	3.00	544,050	4,126,740
†Am. I. & Steel, pf.	April 1	.62½	37,500	525,000
†Am. Sm. & Ref., pf.	April 7	1.75	875,000	10,641,553
*Bald Butte, Mont.	April 15	.06	15,000	1,357,148
*Bartolome Mill, Mex.	Mar. 31	.77	1,540	68,103
*Bunker Hill & Sull.	April 4	.03	9,000	1,478,000
†Central Coal & C., com	April 15	1.50	76,875	397,500
†Central Coal & C., pf.	April 15	1.25	23,437	749,998
*Con. Mercur, Utah	April 9	.03	30,000	970,000
*Daly West, Utah	April 15	.60	108,000	2,691,000
†Dominion Coal	April 1	2.00	60,000	2,280,000
§Dominion I. & St., pf.	April 1	3.50	175,000	700,000
*Empire State, Idaho	April 15	.05	25,277	1,662,770
*Four Oil, Cal.	April 10	.01	2,087	33,392
*General Chem., pf.	April 1	1.50	150,000	2,266,418
*Golden Cycle	Mar. 25	.05	75,000	168,750
Grand Central, Utah	Mar. 20	.10	25,000	656,250
†Liberty Bell, Colo.	April 1	.15	19,552	52,139
†Mary McKinney, Colo.	April 10	.03	30,000	530,000
†New Idria Quicks, Cal.,	April 1	.30	30,000	460,000
Peerless Oil, Cal.	April 1	.12	10,400	86,120
†Sloss-Sheffield S. & I. pf.	Apr. 1	1.75	114,000	1,482,000
*Thirty-Three Oil Cal.	April 6	.10	10,000	160,000
*Trinity County Gold, Cal	April 1	.05	5,000	20,000
†Va.-Car. Chem., pf.	April 15	2.00	240,000	6,540,000
*West Shore Oil, Cal.	April 2	.05	5,000	65,000
Wolverine, Mich.	April 1	2.50	150,000	1,050,000

* Monthly. † Quarterly. § Semi-annual.

ASSESSMENTS.

Name of Company.	Location.	No.	Delinq.	Sale.	Amt.
Alaska	Utah	..	Apr. 14	Apr. 30	.03
Best & Belcher	Nev.	..	Apr. 10	Apr. 30	.15
Burton	Utah	1	Mar. 18	Apr. 3	.001
Brunswick Con.	Cal.	..	Apr. 6	.....	.03
Caledonia	Nev.	..	Apr. 15	.....	.15
Columbus Con.	Cal.	..	Mar. 30	.....	.01½
Con. New York	Nev.	17	Apr. 7	Apr. 28	.05
Fremont Con.	Cal.	..	Apr. 20	.....	.20
Gold Hill	Cal.	..	Apr. 15	.....	.12
Gould & Curry	Nev.	..	Apr. 17	.....	.15
Laurel	Cal.	..	Apr. 2	.....	.03
Marina Marsicana	Cal.	34	Mar. 9	Mar. 30	.02
Occidental	Nev.	41	Mar. 24	Apr. 14	.05
Ophir	Nev.	..	Apr. 10	Apr. 30	.15
Overman	Nev.	12	April 7	April 28	.10
Sampson	Utah	..	April 2	.....	.01
Shasta County S. & R.	Cal.	..	Mar. 30	.....	.10
South Sliger	Cal.	..	Mar. 30	.....	.03
Tonopah & Salt Lake	Nev.	1	Mar. 28	Apr. 17	.10
Union Con.	Nev.	66	Mar. 10	Mar. 30	.10
Vulcan Sm. & Ref.	Cal.	..	Apr. 6	.....	.10
West Century	Utah	..	Mar. 7	Mar. 31	.01
Ybarra	L. Cal.	..	Apr. 3	.....	.10

STOCK QUOTATIONS.

NEW YORK.

Company and Location.	par val	Mar. 18. H.	Mar. 18. L.	Mar. 19. H.	Mar. 19. L.	Mar. 20. H.	Mar. 20. L.	Mar. 21. H.	Mar. 21. L.	Mar. 23. H.	Mar. 23. L.	Mar. 24. H.	Mar. 24. L.	Sales
Alice, Mont.	$25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35	.....	500
Amalgamated c., Mont	100	73¾	72⅛	73	71⅝	73⅛	72⅜	73⅜	73⅛	73⅛	72⅜	72⅝	71⅛	171420
†Anaconda c. Mont.	25	124	122	123	122	123⅛	123	123⅜	123⅛	122	.....	120	119	5,750
Anaconda Gold, Colo.	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Brunswick, Cal.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Caledonia, Nev.	2½	2.60	.....	1.65	.....	2.50	.....	.....	.....	.....	.....	.....	.....	210
Chrysolite, Colo.	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.66	.....	6,000
Comstock T., s., Nev.	2	.15	.14	.15	.14⅛	.14	.....	.....	.....	.12	.....	.11	.....	26,550
Comst T. Bonds	100	.12	.11	.11	.....	.....	.....	.....	.....	.....	.....	.....	.....	37,000
Con. Cal. & Va., g. s. Nev	2½	2.15	.....	.....	.....	2.00	.....	.....	.....	2.00	.....	.....	.....	310
Cons. Imperial, Colo.	1	.....	.....	.06	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Crown Point, Nev.	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Daly, Utah	20	.....	.....	.....	.....	3.15	.....	.....	.....	3.20	.....	3.10	.....	400
Dunkin, Colo.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Elkton g., Colo.	1	.....	.....	.....	.....	.....	.....	.....	.....	.37	.36	.....	.....	1,500
El Paso, Colo.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Dollar, Colo.	1	.....	.....	.....	.....	.....	.....	.....	.....	.06	.....	.....	.....	1,000
Gould & Curry, Nev.	3	.48	.....	.44	.....	.45	.39	.....	.....	.....	.....	.41	.....	1,100
Greene Con., c., Mex.	10	25½	25⅛	25¼	24¾	25⅜	25	25¾	25¼	25⅜	25	25	24¾	10,425
Hale & Norcross	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homestake, S. Dak.	100	69.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50
Horn Silver, Utah	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.35	.....	100
Isabella, g., Colo.	1	.....	.....	.21	.....	.....	.....	.....	.....	.20	.....	.....	.....	1,500
Justice, Nev.	1	.29	.....	.19	.....	.....	.....	.....	.....	.....	.....	.05	.....	2,500
Leadville, Colo.	10	.....	.....	.....	.....	.04	.....	.....	.....	.....	.....	.....	.....	1,500
Little Chief, Colo.	1	.....	.....	.....	.....	.09	.....	.....	.....	.....	.....	.....	.....	500
Ontario, Utah	10	.....	.....	.....	.....	7.00	.....	.....	.....	5.75	.....	.....	.....	250
Ophir, s., Nev	1	2.25	.....	.....	.....	.....	.....	.....	.....	2.15	.....	2.00	.....	600
Overman, Nev.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.54	.53	400
Pharmacist, Colo.	1	.04	.....	.....	.....	.04½	.....	.....	.....	.....	.....	.04	.....	3,000
Phœnix, Ariz.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portland, Colo	10	.....	.....	.....	.....	.....	.....	.....	.....	1.35	.....	1.35	.....	200
Potosi, Nev.	3	.....	.....	.45	.....	.40	.....	.....	.....	.....	.....	.32	.....	1,100
Quicksilver, Cal.	100	.....	.....	.....	.....	.....	.....	.....	.....	1.88	.....	.....	.....	100
Quicksilver, pfd.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Savage, Nev.	2½	.....	.....	.41	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Sierra Nevada, Nev	3	.....	.....	.....	.....	.....	.....	.....	.....	1.05	.....	.....	.....	500
Silver Hill, Nev	1	.....	.....	60	.58	.64	.59	.....	.....	.....	.....	.....	.....	1,100
Small Hopes, Colo.	20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard, Cal.	10	.....	.....	.....	.....	3.00	.....	.....	.....	.....	.....	3.50	.....	350
Syndicate, Cal.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.03	.....	200
Tenn. c., Tenn	25	31	30½	32	30½	31¾	31¼	32¾	32	..	.....	32½	.....	4,000
Union Con., Nev	2½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Union Cop., N. C.	10	2½	.....	2⅜	.....	.....	.....	.....	.....	2½	.....	2⅜	2½	5
White Knob, g. s., Ida	100	.....	.....	.....	.....	.....	.....	11	.....	11¼	11	.....	.....	1

†Per Cent. Total sales 463,680 shares.

BOSTON, MASS.*

Name of Company.	par val	Shares listed.	Mar. 18. H.	Mar. 18. L.	Mar. 19. H.	Mar. 19. L.	Mar. 20. H.	Mar. 20. L.	Mar. 21. H.	Mar. 21. L.	Mar. 23. H.	Mar. 23. L.	Mar. 24. H.	Mar. 24. L.	Sales
Adventure Con., c.	$25	100,000	12½	12	12½	12	11¼	...	11¼	...	11¼	...	11¾	...	1,302
Allouez	25	80,000	8⅜	7¼	8⅛	7⅛	8	7⅜	8	7⅜	8	7⅜	8	7⅜	20,045
Amalgamated, c.	100	1,538,879	73⅜	72¼	73	71⅞	73⅛	72⅜	74	73¼	73	72⅜	72¼	71	24,188
Am. Z. L. & Sm.	25	60,000	12	.....	.....	.....	.....	.....	12⅜	11⅜	12⅜	12¼	.....	.....	2,487
Anaconda, c.	25	1,200,000	30⅛	.....	30⅛	30	30⅜	.....	31⅛	.....	.....	.....	29⅛	.....	290
Arcadian, c.	25	150,000	4⅜	4⅛	4⅜	4⅛	4⅞	.....	4⅛	.....	4⅛	.....	4⅜	4 1/16	1,995
Arnold	25	60,000	.90	.....	.95	.....	.....	.....	.....	.....	.....	.....	.75	.....	150
Atlantic, c.	25	100,000	14	13⅜	13⅜	13⅛	.....	.....	13¼	.....	13⅜	.....	13⅜	13	870
Bingham Con., g. s.	50	150,000	35	34¼	34⅜	34¼	34⅜	34⅜	34⅜	.....	34⅜	.....	34⅜	33¾	1,410
Bonanza	10	300,000	.90	.80	.....	.....	.85	.....	.....	.....	.....	.....	.85	.....	975
British Columbia	15	250,000	6⅜	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Cal. & Hecla, c.	25	100,000	545	540	550	.....	.....	.....	.....	.....	542	541	540	530½	106
Catalpa	10	300,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Centennial, c.	25	90,000	28¾	28¼	28⅛	28⅜	28⅛	28¼	28¾	28⅛	29	28¼	29	27	1,628
Central Oil	25	60,050	.....	.....	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	20
Con. Mercur, g.	5	1,000,000	1⅝	1 13/16	1⅝	1½	1⅝	1½	1⅝	.....	1⅝	1 15/16	1 13/16	1 13/16	3,185
Continental Zinc	25	22,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	116	.....	50
Copper Range Con.	100	285,000	71	70	.....	.....	70½	69¾	70¾	70¼	70¼	70¼	70	69	3,221
Daly-West., g. s.	20	180,000	41¾	41	41¾	41	42	41	42	41¾	42½	42	42¾	42	1,140
Dominion Coal	100	150,000	122	121¼	120¾	118†	118	116	†116½	116	†116	.....	116⅜	115½	8,874
Dominion Coal, pf.	100	30,000	116¼	116	.....	.....	116¼	.....	.....	.....	116	.....	.....	.....	169
Dominion I & S.	100	100,000	38¼	35¾	36	32	35	33⅜	33¾	31¼	34	28¼	33¼	32	15,194
Elm River	12	100,000	5⅝	4¾	5	4¾	4⅝	4½	4¾	4½	4⅞	4⅝	4¾	4¼	13,158
Franklin, c.	25	100,000	12½	12	12	.....	.....	.....	11¼	.....	11⅜	11¼	12	.....	265
Guanajuato, Con.	5	385,000	2	.....	2	.....	2	.....	1⅞	1⅝	1¾	1⅝	1⅞	1½	1,185
Isle Royale Con., c.	25	385,000	14	.....	14	13	14	13⅜	14	13¼	14	.....	13⅜	13¼	1,055
Mass Con., c.	25	100,000	11	10⅜	10⅝	10¼	11	10½	10⅝	.....	10¾	10¼	10⅜	10¼	2,000
Mayflower, c.	25	100,000	1⅜	.....	2	.....	2¼	2	.....	.....	.....	.....	.....	.....	1,270
Michigan, c.	25	100,000	10½	.....	10⅜	.....	.....	.....	.....	.....	10	.....	.....	.....	405
Mohawk, c.	25	100,000	56	54½	55	.....	55½	54¼	56⅛	55	56½	55¾	55½	54½	1,554
Mont. Coal & Coke	25	200,000	.....	.....	.....	.....	.....	.....	7	.....	7¼	.....	.....	.....	115
Mont'l & Boston, c.	5	570,000	1⅜	1⅛	1⅜	1 11/16	1⅛	.....	1⅜	.....	1⅜	.....	1 1/16	.....	2,325
New Idria, g.	5	100,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Old Colony, c.	25	100,000	.....	.....	2¼	2	2¼	2	.....	.....	.....	.....	2	.....	830
Old Dominion, c.	25	150,000	.....	.....	21	.....	.....	.....	.....	.....	20½	20	20	.....	500
Osceola, c.	25	96,150	73	71	72	.....	72	.....	73	72¼	73	72¼	73	72¼	1,598
Parrot, s. c.	10	229,850	32⅜	32¼	32⅜	.....	32¼	32	32⅜	.....	32¾	32½	33	32¼	319
Phoenix Con., c.	25	100,000	6	.....	.....	.....	6¼	6	6¼	.....	6	.....	6¼	6	525
Quincy, c.	25	100,000	.....	.....	.....	.....	130½	120	121	120	121	120	120	119	75
Rhode Island, c.	25	100,000	3½	3	3½	3¼	.....	.....	3½	.....	3½	.....	.....	.....	1,035
Santa Fe, g. c.	10	250,000	2¾	.....	.....	.....	2⅝	2⅜	.....	.....	2¾	2½	2⅝	.....	440
Shannon, c.	10	183,286	14	13½	14¼	13⅞	14⅛	14	14⅛	14	14	13⅞	13⅞	13¾	6,997
Tamarack, c.	25	60,000	.....	.....	180	.....	181	.....	.....	.....	180	.....	176½	175	58
Tecumseh	25	80,000	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	215
Tennessee	25	175,070	31½	.....	32⅜	31¼	32¾	.....	33	.....	.....	.....	.....	.....	800
Trimountain	25	100,000	.....	.....	.....	.....	.....	.....	98¼	.....	96	.....	.....	.....	110
Trinity, c.	25	160,000	11¼	11	11⅜	11¼	.....	.....	11⅜	.....	11¼	11¼	11¾	.....	667
United States, g.	25	419,000	25⅞	25½	26	25⅜	.....	.....	26	.....	.....	.....	25⅝	24⅝	7,656
U. S. Coal & Oil	25	240,000	16½	15¼	16¼	16	16¼	15⅞	16	.....	16¼	16	16	15¾	4,139
Utah Con., g.	5	300,000	29¾	29	29¾	29	29⅝	29¼	29⅝	29¼	30	29¼	29¼	29	6,625
Victoria, c.	25	100,000	8¾	7⅞	8	.....	7⅞	7⅞	8	7⅞	8	7⅞	7⅞	.....	4,749
Washington	25	60,000	.35	.....	.60	.....	.....	.....	.....	.....	.....	.....	.44	.....	500
Winona, c.	25	100,000	‡13½	13	13½	13	‡13½	13	13¾	12¾	13	12¾	‡13	13½	4,467
Wolverine, c.	25	60,000	†73	72½	74	72¼	75	74	77	75	75	73	†75	.....	1,130
†Wolverine, pf.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wyandot	25	100,000	2⅜	2¼	2⅜	2¼	2⅜	2¼	2⅜	2¼	2⅜	2¼	2⅜	2¼	8,360

* Boston Stock Exchange. † Ex Dividend. ‡ Assessment Paid. Total sales, 162,384 shares.

COAL, IRON AND INDUSTRIAL STOCKS.*

Name of Company.	Par val	Mar. 18. H.	Mar. 18. L.	Mar. 19. H.	Mar. 19. L.	Mar. 20. H.	Mar. 20. L.	Mar. 21. H.	Mar. 21. L.	Mar. 23. H.	Mar. 23. L.	Mar. 24 H.	Mar. 24 L.	Sales
Allis-Chalmers, U. S.	100	19½	19	21½	19½	21½	19¾	21½	19¼	.....	.....	.....	.....	.....
Allis-Chalm's, pf, U.S.	100	87	81	87	81	88	81	87	81	.....	.....	.....	.....	.....
Am. Agr. Chem., U.S.	100	25	22	.....	.....	25¼	.....	25¼	21¾	.....	.....	25⅛	22½	.....
Am. Agr. Chem. pf, U.S.	100	81¾	81	87	81	88	81	81	.....	.....	.....	80	79	.....
Am. Sm. & Ref., U.S.	100	50¾	50⅛	50⅛	50	50⅜	49⅝	49⅞	49⅜	49½	49	49	47⅝	33,746
Am. Sm. & Ref. pf, U.S.	100	98¾	95¾	97	95¼	‡94⅞	94¾	94½	.....	94¾	94	.....	.....	5,420
Am. Steel & Fdy., U.S.	100	17	15⅜	16	14	15	.....	.....	.....	.....	.....	.....	.....	100
Am. S. & Fdy. pf., U.S.	100	63	60	.....	.....	62	.....	62	.....	.....	.....	63	.....	300
Col. Fuel & I., Colo.	100	65	.....	67¾	65	68¾	67½	69¼	69	69¼	68¼	68¾	66¾	10,300
Col. & H. C. & I., Colo.	100	.....	.....	20¼	.....	‡20	.....	.....	.....	.....	.....	20½	20¼	1,000
†Crucible Steel, U. S.	100	20¼	20	20¾	19¾	20¾	20¼	20⅝	20¼	20⅝	20½	20	19½	7,201
†Crucible Steel, pf, U S	100	85½	84¼	84¾	83¾	84¼	84	84	83⅝	84	83⅞	84	83⅛	2,178
†Mong. R. Coal, Pa.	100	.....	.....	11⅝	.....	11⅝	.....	11⅝	.....	11⅝	.....	.....	.....	1,500
†Mong. R. Coal pf, Pa	100	40	39¾	40½	40	40	39¾	39¾	39⅝	39¾	39¼	39	.....	850
National Lead, U.S.	100	28¾	26½	27⅛	28¼	28⅝	27⅛	27⅛	.....	27¾	27⅝	27¼	26¼	5,075
National Lead pf, U.S.	100	92¼	91⅞	92¼	92	94	92	93¼	.....	93	.....	.....	.....	1,580
†Phila Nat. Gas	100	47¼	47	46¾	.....	48	46¾	47¾	47⅝	47¾	47	46¾	45¼	5,444
†Phila Nat. Gas, pf	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	48¾	.....	50
†Pittsburg Coal, Pa.	100	30	29½	30	29½	29½	29	.....	.....	.....	.....	29¾	29⅛	4,059
†Pittsburg Coal pf, Pa	100	91	90⅛	90¾	90¼	91	90⅝	.....	.....	90¼	.....	90¼	.....	637
Republic I & S., U.S.	100	20½	20¼	20⅝	20¼	20¾	20¼	21	20⅝	20⅞	20½	20⅝	20	6,650
Republic I. & S., pf, U.S.	100	78⅜	78	78¼	78¼	78¼	78	78¼	78	79	.....	78	.....	1,420
Sloss-Shef S. & I., Ala.	100	61¼	.....	63	62	63	62	.....	.....	62	.....	.....	.....	1,100
Sloss-Shef S. & I. pf, Ala.	100	.....	.....	95	.....	.....	.....	.....	.....	.....	.....	.....	.....	115
Standard Oil, U.S.	100	672	.....	675	671	680½	680	685	.....	689	685	684¾	.....	126
Tenn. C. I. & R. R., Ala.	100	66⅞	65⅝	67⅜	66⅝	67¾	67⅛	68⅜	67⅜	68⅜	67⅛	68	66⅛	55,225
U. S. Red & Ref., U. S.	100	.....	.....	20	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
U. S. Red & R. pf., U.S.	100	.....	.....	.....	.....	69	68¾	.....	.....	.....	.....	.....	.....	400
U.S. Steel Corp., U.S.	100	37¼	36⅝	37¼	37	37⅜	37	37⅜	37⅜	37¼	37¼	36¾	36¼	37,770
U.S. Steel Corp. pf, U.S.	100	86¾	86⅜	87¼	86⅜	87¼	87⅛	87¾	87⅜	87¼	87⅛	87⅛	86⅜	21,760
Va.-Car Chem., U.S.	100	64	.....	64¼	63¾	64½	63¾	64¾	63¾	64	63⅝	.....	.....	7,780
Va.-Car Chem. pf, U.S.	100	.....	.....	127	126½	126	.....	.....	.....	.....	.....	.....	.....	500
Va. I. C. & Coke, U. S.	100	37¼	37	.....	.....	37	.....	37	.....	38	36¾	36¾	.....	500
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

* New York Stock Exchange. † Pittsburg Stock Exchange. ‡ Ex-dividend. Total sales, 493,861 shares.

COLORADO SPRINGS, COLO.*

Name of Company.	Par val	Mar. 16. H.	Mar. 16. L.	Mar. 17. H.	Mar. 17. L.	Mar. 18. H.	Mar. 18. L.	Mar. 19. H.	Mar. 19. L.	Mar. 20. H.	Mar. 20. L.	Mar. 21. H.	Mar. 21. L.	Sales
Acacia	$1	.09¼	.09	.09½	.09	.09¾	.09	.09½	.09¼	.09½	.09	.09⅝	.09	1,000
C. C. & M.	1	.02⅛	.02	.02½	.02	.02½	.02	.02½	.02	.02½	.02	.02⅝	.02	4,000
Am. Con.	1	.02¾	.02	.02¾	.02	.02¾	.02	.02⅜	.02¼	.02½	.02	.02¾	.02⅜	2,000
Anaconda	1	.17	.15	.18	.15	.17	.15	.17⅜	.13	.18	.13	.18	.13	.....
Ben Hur	1	.....	.02	.02½	.02	.02¾	.02	.....	.02	.....	.02	.02⅜	.....	.....
Coriolanus	1	.03½	.....	.03½	.....	.04	.....	.04	.....	.04	.....	.04	.....	.....
Blue Bell	1	.....	.....	.08	.....	.....	.....	.08	.....	.07	.....	.08	.....	.....
C. K. & N.	1	.14	.13½	.14⅜	.13½	.15	.14	.15	.14½	.15⅜	.14½	.....	.....	4,000
C. C. Con.	1	.....	.05	.05½	.04⅜	.05	.04¾	.05	.04¾	.05	.04⅜	.05	.04⅜	6,000
Des Moines	1	.03¼	.02½	.02¾	.02½	.02¾	.....	.....	.02¼	.02¾	.02	.02	.....	500
Dr. Jack Pot.	1	.10	.09½	.09⅞	.09¼	.09⅞	.09½	.10	.09½	.09½	.....	.09½	.....	5,500
Elkton Con.	1	.37¼	.36¾	.37¼	.35	.37½	.35½	.36¾	.35	.36	.34	.36⅜	.24	4,100
El Paso	1	.58	.57	.57⅜	.57	.57½	.57	.57¼	.57	.57	.....	.57¼	.57½	6,300
Fannie Rawlings	1	.05	.....	.05	.....	.05	.....	.04	.03	.04	.03	.04	.03	.....
Findley	1	.12½	.10¾	.12½	.11¾	.12⅜	.11½	.12½	.11⅜	.12	.11⅜	.12	.....	.....
Gold King	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Dollar Con.	1	.05½	.05½	.05½	.04⅝	.05½	.04⅝	.05	.04⅜	.05½	.04⅜	.05½	.04⅝	5,000
Golden Cycle	1	.....	.....	.77½	.73⅝	.73½	.72½	.74	.72⅜	.75	.73	.73	.71	5,000
Golden Fleece	1	.11	.05	.....	.....	.05	.11	.....	.11	.05	.11	.....	.....	.....
Gould	1	.04½	.04¼	.04¼	.04⅜	.04⅜	.03¾	.04⅜	.03⅝	.04⅜	.03⅝	.04¼	.04

STOCK QUOTATIONS.

MEXICO*. March 13.

Name of Company	Shares Issued.	Last div'd	Prices. Bid.	Prices. Ask.
Durango.				
Ca. Min. de Penoles	2,500	$50.00	$4,000	$4,500
San Andres de la Sierra	200	.....	1,000	.....
Guananjuato.				
Angustias, Pozos	2,400	5.00	80	90
Cinco Senores y An., aviadoras	2,000	15.00	240	250
Cinco Senores y An., aviada	400	10.00	215	225
Providencia, SanJuan de la Luz	6,000	2.00	180	190
Queensland y Australia	300	.....	110	120
Guerrero.				
Garduno y Anexas	7,200	.....	35	60
Hidalgo.				
Amistad y Concordia	9,600	5.30	71	72
Carmen, aviada	1,100	.....	115	125
Guadalupe Fresnillo mill	1,000	.....	250	300
Guadalupe Fresnillo Mine	1,400	.....	70	80
La Blanca, aviadora	1,536	.....	1,200	1,300
La Blanca, aviada	768	.....	850	900
La Reina y An., aviadora	5,000	.....	20	26
Maravillas y An., aviador	1,680	.....	.....	.....
Maravillas el Lobo	1,000	.....	130	180
Palma y An., aviador	1,800	.....	.....	12
Real del Monte	2,554	10.00	700	800
Santa Ana y An., aviadora	1,800	.....	30	35
Santa Ana y An., aviada	600	.....	25	30
Sta. Gertrudis y An., aviadas	9,600	.....	7	8
Sta. Gertrudis y An., aviadora	28,800	1.00	80	81
Santo Tomas Apostol aviadoras	5,100	.....	1	2
San Felipe de Jesus, aviadora	3,600	.....	.....	40
San Felipe de Jesus, aviada	1,200	.....	.....	10
San Rafael y An., Trompillo	1,200	12.00	915	920
San Rafael y An., aviada	1,200	$8.00	$395	$410
Soledad, aviada	960	5.00	300	310
Sorpresa, aviada	960	5.00	280	300
Mexico.				
Alacran	2,400	.....	30	40
Buen Despacho	3,000	.....	60	65
Dos Estrellas	3,000	30.00	1,950	2,000
La Esperanza (El Oro)	3,000	10.00	1,190	1,200
La Reformia, aviadores	2,000	.....	58	60
Santa Ana, Esperanza	2,400	.....	70	96
Michoacan.				
Luz de Borda, aviadora	3,000	.....	50	53
Luz de Borda, aviada	1,000	.....	14	16
San Luis Potosi.				
Concepcion y An	3,000	.....	100	130
El Barreno, aviadora	2,000	2.00	56	54
Sta. Maria de la Paz	2,400	10.00	780	785
San Diego y Annexas	2,400	4.00	25	.....
Zacatecas.				
Asturiana y An	2,500	.....	50	70
Candelaria y Pinos	2,500	10.00	300	310
Esperanza y An	2,400	.....	50	40
Lourdes	2,500	.....	20	30
Luz de Minillas, pagadoras	2,000	.....	25	30
San Carlos y Annexas	2,500	20.00	175	190
Sta. Maria de Gaud	2,500	10.00	110	120
Miscellaneous.				
Bartolome de Medina	2,000	1.50	75	85
Guadalupe Hacienda	10,000	3.00	250	260
La Luz Hac. (Pachuca)	3,750	.....	300	305
La Reina (Chihuahua)	192	.....	.....	.....
Naica (Chihuahua)	100	.....	.....	.....
Natividad (Oaxaca) aviadora	1,800	6.00	550	650
Natividad (Oaxaca) aviadas	600	4.00	500	550
San Francisco Hac	6,000	1.00	50	55
Santa Ana Huantla Morelos	4,000	.....	.....	.....
Union Hacienda	3,000	5.00	240	260

*Values are in Mexican currency.

SAN FRANCISCO (*By Telegraph*).

Name of Company.	March. 23.	March. 24.	Name of Company.	March. 23.	March. 24.
Belcher	.55	.56	Justice	.12	.13
Best & Belcher	2.15	2.00	Mexican	1.35	1.40
Caledonia	2.35	2.35	Occidental Con	.44	.50
Challenge Con	.55	.59	Ophir	2.00	2.05
Chollar	.39	.41	Overman	.52	.53
Confidence	1.25	1.35	Potosi	.32	.34
Con. Cal. & Va	2.00	2.00	Savage	.33	.35
Con. Imperial	.04	.04	Sierra Nevada	.89	.89
Crown Point	.35	.36	Union Con	1.00	1.10
Gould & Curry	.38	.38	Utah Con	.28	.30
Hale & Norcross	.70	.76	Yellow Jacket	.44	.50

SALT LAKE CITY.* Mar. 20.

Name of Company	Shares.	Par Val	High	Low	Sales.	Name of Company.	Shares.	Par Val	High	Low	Sales.
Ben Butler	500,000	$1	.08½	.08½	1,000	M. Washington	.....	.....	.06	.05½	5,000
California	300,000	1	.06½	.04½	15,450	Mammoth	400,000	25	1.60	1.56	200
Carisa	500,000	1	.13½	.13	2,000	May Day	400,000	.25	.19¼	.16½	47,050
Century	150,000	1	.74	.40	5,800	N. Y. Bonanza	.....	.....	.24½	.22½	13,800
Con. Mercur	1,000,000	5	1.59¼	1.53	8,466	Ontario	150,000	100	6.50	6.50	325
Creole	.....	.....	.60	.59	500	Sacramento	1,000,000	5	.27½	.26½	18,700
E. & B. Pencil	.....	.....	.78½	.78½	400	Star Con	500,000	1	.09½	.09½	200
Daly	.....	.....	3.00	2.40	900	S Swansea	300,000	1	.21	.21	2,000
Daly-Judge	300,000	1	11.52½	10.50	5,915	Tetro	.....	.....	.20	.19	1,700
Daly-West	180,000	20	41.75	38.85	2,450	Uncle Sam, Con	500,000	1	.25	.24½	6,250
Grand Central	250 000	1	5.50	5.10	1,700	Victor	500,000	1	.24½	.24	2,200
L. Mammoth	150,000	1	.61½	.59¾	4,000	Wabash	.....	.....	.29¼	.26¼	31,900
La Reine	.....	.....	.06	.04¾	19,700	Yankee Con	500,000	1	.42	.39	700

All mines are in Utah. *By our Special Correspondent. Total sales, 199,106 shares.

ST. LOUIS, MO.* Mar. 21.

Name.	Capital Stock.	Par Val.	Prices. Bid.	Prices. Ask.	Name.	Capital Stock.	Par Val.	Prices. Bid.	Prices. Ask.
Am.-Nettie, Colo	$3,000,000	$10	$0.30	$0.65	Columbia Lead, Mo.	$500,000	10	11.00	12.50
Catherine Lead, Mo.	500,000	10	1.50	3.00	Con. Coal, Ill	500,000	100	21.00	22.50
Central Coal & C	1,875,000	100	67.00	68.00	Doe Run Lead Co.	1,500,000	100	105.00	110.00
Central C. & C., pf.	1,875,000	100	76.00	77.00	Granite Bimet., Mt.	1,000,000	10	.85	.93
Central Lead, Mo	1,000,000	10	135.00	140.00	St. Joe Lead, Mo	6,000,000	10	15.75	17.25

*From our Special Correspondent.

PHILADELPHIA, PA.*

Name and Location of Company.	par val	Mar. 18. H.	Mar. 18. L.	Mar. 19. H.	Mar. 19. L.	Mar. 20. H.	Mar. 20. L.	Mar. 21. H.	Mar. 21. L.	Mar. 23. H.	Mar. 23. L.	Mar. 24. H.	Mar. 24. L.	Sales
Am. Alkali, Mich	$50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Cement	10	8	.....	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	217
Cambria Iron, Pa	50	.....	.....	.....	.....	47⅜	.....	.....	.....	.....	.....	47⅜	.....	76
Cambria Steel, Pa	50	25¼	25	25½	25	.....	.....	25⅛	.....	25	.....	25⅛	24⅜	3,068
Penn. Steel, pfd	100	93⅜	93	93⅜	.....	.....	.....	.....	.....	93	.....	.....	.....	200
Susq. I. & S., Pa	5	.....	.....	2¼	.....	2¼	.....	.....	.....	2¼	.....	.....	.....	350
United Gas I., Pa	50	109½	107¾	110	109⅝	110	109¼	109⅝	109⅛	109⅛	109	109½	109	2,984
Warwick I. & Steel	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5⅛	5	429

*Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 7,314 shares.

LONDON. March 10.

Name and Country of Company	Shares Issued.	Par value. £. s. d.	Latest dividend. Amt. s. d.	Date	Quotations. Buyers. £ s. d.	Sellers. £ s. d.
Alaska-Treadwell, g., Alaska	200,000	5 0 0	1 6	Jan., 1903	4 12 6	4 15 0
Anaconda, c. s., Montana	1,200,000	5 0 0	2 0	Nov., 1902	6 2 6	6 5 0
Arizona, c., Def., ord	63,444	1 0 0	5 6	Feb., 1903	7 0 0	7 10 0
Arizona, pref., ord	316,530	1 0 0	5 6	Feb., 1903	7 7 6	7 12 6
Camp Bird, g., Colorado	738,000	1 0 0	0 7½	Mar., 1903	1 11 0	1 12 0
Copiapo, c., Chile	112,500	2 0 0	6 10½	Mar., 1903	2 2 6	2 7 6
De Lamar, g. s., Idaho	80,000	1 0 0	2 0	Nov., 1902	11 3	13 9
Enterprise, g., British Col	165,000	1 0 0	.....	.....	2 6	7 6
El Oro, g., Mexico	980,000	1 0 0	1 6	Dec., 1902	1 10 0	1 12 6
Frontino & Bolivia, g., Colombia	128,662	1 0 0	3 0	July, 1901	18 9	1 1 3
Le Roi, g., British Col	200,000	5 0 0	5 0	Nov., 1899	1 11 3	1 13 9
Le Roi No. 2, g., British Col	120,000	5 0 0	5 0	May, 1902	18 9	1 1 3
Mesquital, Mexico	250,000	2 0	3	Feb., 1903	4 0	5 0
Montana, g. s., Montana	657,128	1 0 0	6	April, 1899	2 0	3 0
Mountain c., Cal	250,000	5 0 0	4 0	Nov., 1902	3 2 6	3 7 6
Stratton's Independence, Colorado	1,000,007	1 0 0	6	April, 1902	10 6	11 6
St. John del Rey., g., Brazil	548,265	1 0 0	6	Dec., 1902	15 0	16 0
Utah Con., g. c., (Highland Boy), Utah	300,000	1 0 0	7 0	Jan., 1903	5 15 0	6 5 0
Ymir, g., British Col	200,000	1 0 0	1 0	Mar., 1902	10 0	12 6
European:						
Linares, l., Spain	15,000	3 0 0	9	Oct., 1902	3 10 0	4 0 0
Mason & Barry, c., sul., Port'g'l	185,172	1 0 0	13 0	May, 1902	3 17 6	4 2 6
Rio Tinto, c., Spain	325,000	5 0 0	22 6	Nov., 1902	52 5 0	52 10 0
Rio Tinto, pref., Spain	325,000	5 0 0	2 6	Nov., 1902	6 0 0	6 5 0
Tharsis, c., Spain	625,000	2 0 0	8 0	May, 1902	4 15 0	5 0 0
Australia and New Zealand:						
Assoc. Gold Mines, W. Australia	495,388	1 0 0	1 6	Jan., 1900	2 2 6	2 3 9
Briseis, Tin, Tasmania	980,000	1 0 0	.....	.....	8 9	9 0
Broken Hill Pr'p., s., N. S. Wales	980,000	8 0	1 0	Feb., 1903	1 15 0	1 17 6
Cosmopolitan Prop., W. Australia	385,000	1 0 0	6	July, 1902	15 6	16 6
Golden Horse Shoe, W. Australia	300,000	5 0 0	6 0	Nov., 1902	11 8 9	11 11 3
Great Fingall Con., W. Australia	250,000	1 0 0	5 0	Sept., 1902	7 11 3	7 13 9
Great Bo'd'r Pr'p., W. Australia	1,750,000	2 0	6	Mar., 1903	1 2 0	1 2 6
Ivanhoe Gold Corp. W. Australia	500,000	5 0 0	4 0	Jan., 1903	8 17 6	9 0 0
Kalgurli, g., W. Australia	120,000	1 0 0	2 6	Jan., 1903	4 6 3	4 8 9
Lake View Cons., g., W. Australia	250,000	1 0 0	rts.	Aug., 1902	2 17 6	3 0 0
Mt. Lyell M. & R. I., c., Tasmania	275,000	3 0 0	1 0	Jan., 1903	3 10 0	3 15 0
Mt. Morgan, g., Queensland	1,000,000	1 0 0	3	Mar., 1903	4 0 0	4 5 0
Waihi, g., New Zealand	497,412	1 0 0	2 6	Mar., 1903	5 6 3	5 8 9
Indian:						
Champion Reef, g., Colar Fields	473,000	10 0	5 0	Jan., 1903	6 18 9	7 1 3
Mysore Gold, Colar Fields	530,000	10 0	5 0	Mar., 1903	7 3 0	7 6 3
Nundydroog, g., Colar Fields	484,000	10 0	1 6	Mar., 1903	2 5 0	2 7 6
Ooregum, g., Colar Fields	343,000	10 0	1 3	Dec., 1902	1 15 0	1 17 6
Ooregum, pref., g., Colar Fields	240,000	10 0	1 3	Dec., 1902	2 3 9	2 6 3
African:						
Angelo, g, Transvaal	600,000	1 0 0	0 0	Feb., 1903	7 5 0	7 10 0
Bonanza, g., Transvaal	200,000	1 0 0	12 0	Feb., 1903	5 12 6	5 15 0
British South Africa	4,436,019	1 0 0	rts.	May, 1899	3 2 6	3 5 0
Cape Copper, S. Africa	300,000	2 0 0	8 0	Jan., 1902	2 17 6	3 2 6
Cape Copper, pref., S. Africa	75,000	2 0 0	2 3	Jan., 1903	3 2 6	3 7 6
City and Sub'n (New), g., Transvaal	340,000	4 0 0	8 0	Aug., 1899	6 2 6	6 7 6
Crown Reef, g., Transvaal	120,000	1 0 0	15 0	Oct., 1902	17 5 0	17 15 0
De Beers Con., d., pref., Cape Colony	800,000	2 10 0	.....	Jan., 1903	19 17 6	20 0 0
De Beers Con., def	1,000,000	2 10 0	12 6	Jan., 1903	22 1 3	22 3 9
East Rand, Prop, Transvaal	970,000	1 0 0	rts.	May, 1902	8 2 6	8 5 0
Ferreira g., Transvaal	90,000	1 0 0	20 0	Feb., 1903	22 10 0	23 0 0
Geldenhuis Est., g., Transvaal	200,000	1 0 0	5 0	Feb., 1903	6 16 3	6 18 9
Geduld, g, Transvaal	400,000	1 0 0	rts.	Mar., 1902	7 18 9	8 1 3
Henry Nourse, g., Transvaal	125,000	1 0 0	8 0	Feb., 1903	9 0 0	9 5 0
Jagersfontein, d., Orange F. S	200,000	5 0 0	6 0	Nov., 1899	26 7 6	26 12 6
Jubilee, g., Transvaal	50,000	1 0 0	bonus.	Aug., 1902	5 7 6	5 12 6
Jumpers, Transvaal	100,000	1 0 0	5 0	Aug., 1899	3 17 6	4 2 6
Langlaagte Est., g., Transvaal	470,000	1 0 0	3 0	Sept., 1899	4 5 0	4 7 6
May Con., g., Transvaal	288,750	1 0 0	3 0	Feb., 1903	4 10 0	4 12 6
Meyer & Charlton, g., Transvaal	100,000	1 0 0	3 0	Feb., 1903	5 10 0	5 15 0
Namaqua, c., Cape Colony	94,331	2 0 0	2 0	June, 1902	3 10 0	3 15 0
Primrose (New), g., Transvaal	325,000	1 0 0	2 0	Feb., 1903	3 17 6	4 0 0
Rand Mines, g., S. Africa	1,795,956	5 0	4 0	Aug., 1902	10 15 0	10 17 6
Robinson, g., Transvaal	760,000	5 0 0	6 0	Feb., 1903	10 12 6	10 17 6
Robinson Deep, g., Transvaal	950,000	1 0 0	5 0	May, 1899	5 2 6	5 5 0
Rose Deep, Transvaal	425,000	1 0 0	2 0	Feb. 1903	9 2 6	9 2 6
Salisbury, g., Transvaal	100,000	1 0 0	2 0	Mar., 1899	2 15 0	3 0 0
Sheba, g., Transvaal	1,075,000	1 0 0	6	July, 1898	1 3 9	1 5 0
Village Main Reef, Transvaal	400,000	1 0 0	5 0	Oct., 1902	8 12 6	8 17 6
Wemmer, Transvaal	80,000	1 0 0	10 0	Jan., 1903	12 12 6	12 17 6

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver.

LONDON. (*By Cable*).*

Name of Company.	Mar. 17. £. s. d.	Mar. 24. £. s. d.	Name of Company	Mar. 17. £. s. d.	Mar. 24. £. s. d.
Anaconda	6 10 0	6 5 0	Johannesburg Invest	3 7 6	3 7 6
British South Africa	3 6 3	3 6 3	Modderfontein	10 17 6	10 16 3
Camp Bird	1 9 9	1 10 6	Rand Mines	11 0 0	10 18 9
Con. Gold-Fields	7 18 9	7 16 3	Rio Tinto com	52 10 0	52 2 6
De Beers Con. def	21 6 3	21 5 0	Simmer & Jack	1 15 7½	1 16 3
East Rand	8 5 0	8 13 9	Tomboy	1 17 6	1 18 1¾
Jagersfontein	26 5 0	26 5 0	.....	.....	.....

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Mar. 4

Name of Company.	Country.	Product.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Prices. Closing Fr.
Boleo	Lower Cal	Copper	.....	500	176.00	1,500.00	1,520.00
Champ d'Or	S. Africa	Gold	3,375,000	25	3.75	22.00	22.00
Fraser River	Brit. Col'mb.	Gold	250,000	25	.....	6.50	6.50
Huanchaca	Bolivia	Silver	40,000,000	125	5.00	102.50	107.00
Metaux, Cie. Fran. de	France	Metal dealers	25,000,000	500	22.50	489.00	494.00
Nickel	N. Caled'nia	Nickel	15,000,000	250	22.50	471.00	472.00
Rebecca	Colo'do, U. S.	Gold	5,000,000	25	.....	0.75	0.75
Vielle Montagne	Belgium	Zinc	9,000,000	30	30.00	644.00	645.00

TORONTO, ONT.* Mar. 21.

Name of Company.	par val	Prices. High.	Prices. Low.	Sales.	Name of Company	Par val	Prices. High.	Prices. Low.	Sales.
Black Tail	$1	.07	.04	.....	Granby Smelter	$10	510	465	.....
Cariboo (Mc. K.)	1	.17	.12	.....	Mountain Lion	1	.14	.10	1,000
Cariboo (Hyd.)	1	.75	.....	.....	North Star	1	.13	.10½	.....
Center Star	1	.33	.29	2,000	Nova Scotia Steel, com	100	108	107	.....
Crows Nest, C	100	350	300	.....	Payne	1	.21	.18	1,000
Dominion Coal, com	100	122¼	118¼	300	Rambler Cariboo	1	.35	.25	.....
Dominion S. & I.	100	35	31¾	.....	Republic	1	.07	.05	.....
Dominion S. & I., pref.	100	.....	.....	.....	St. Eugene	1	.35	.28	.....
Fairview	1	.05¼	.04¾	.....	Virtue	1	.09	.06	500
Giant	1	.03¼	.02	.....	War Eagle Con	1	.17½	.15	.....

*Standard Stock and Mining Exchange. Total sales 4,800 shares.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—	Cust. Meas.	Price.
Carborundum, f.o.b. Niagara Falls, Powd., F.FF.FFF.	lb.	$0.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass.	"	.04½@.05
Barry's Bay, Ont.	"	.07½@.09½
Mont., car-lots, f.o.b., Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, Turkish flour in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Naxos flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Chester flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour, in kegs	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.; Abbott (Turkey)	lg.ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos (Greek) h. gr.	"	26.00
Garnet, as per quality	sh.ton	25.00@35.00
Pumice Stone, Am. Powd.	lb.	.01⅝@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.40
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg.	"	.07
ACIDS—		
Boracic, crystals	"	.10¾@.11
Powdered	"	.11¼@.11½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.20
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N.J.	"	.08
ALCOHOL—Grain	gal.	2.43@2.45
Refined wood 95@97%	"	.60@.65
Purified	"	1.20@1.50
ALUM—Lump	100 lbs.	1.75
Ground	"	1.80
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lbs.	2.60
Sulphate, com'l	"	1.25@1.50
AMMONIA—		
Aqua, 16°	lb.	.03
18°	"	.03¼
20°	"	.03¾
26°	"	.05½
AMMONIUM—		
Carbonate, lump	"	.07¼
Powdered	"	.08
Muriate	"	.05⅝
Lump	"	.08¼
Nitrate, white pure (99%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05⅝@.07¼
Oxide, com'l white, 95%	"	.09½
Com'l white, 98%	"	.12
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White powd.	"	.03@.03½
Red	"	.06½@.06¾
ASPHALTUM—		
Ventura, Cal.	sh.ton	32.00
Cuban	lb.	.01½@.03½
Egyptian, crude	"	.05½@.06
Trinidad, refined	sh.ton	35.00
San Valentino (Italian)	lg.ton	16.00
Seyssel (French), mastic	sh.ton	21.00
Gilsonite, Utah, ordinary	lb.	.03
Select	"	.03¾
BARIUM—		
Carb. Lump, 80@90%	sh.ton	25.00@27.50
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01¾@.02
Chloride, com'l	100 lbs.	1.67½@1.76
Chem. pure cryst	lb.	.06
Nitrate, powdered	"	.06½

BARIUM	Cust. Meas.	Price.
Sulphate (Blanc Fixe)	lb.	$0.02
BARYTES—		
Am. Crude, No. 1	sh.ton	9.00
Crude, No. 2	"	8.00
Crude, No. 3	"	7.75
German, gray	"	14.50
Snow white	"	17.00
BAUXITE—Ga. or Ala. Mines:		
First Grade	lg.ton	5.50
Second grade	"	4.75
BISMUTH—Subnitrate	lb.	2.00
Subcarbonate	"	2.25
BITUMEN—"B"	"	.03½
"A"	"	.05
BONE ASH	"	.02¼@.02½
BORAX	"	.07¼@.07½
BROMINE—Bulk.	"	.35
CADMIUM—Metallic	"	1.40
Sulphate	100 lbs.	2.00@2.50
CALCIUM—Acetate, gray	"	1.30
" brown	"	.90
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh.ton	70.00
Carbonate, ppt.	lb.	.05
Chloride	100 lbs.	.70@.90
CEMENT—		
Portland, Am., 400 lbs.	bbl.	1.70@1.90
Foreign	"	1.65@2.25
"Rosendale," 300 lbs	"	.75
Slag cement, imported	"	1.65
CERESINE—		
Orange and Yellow	lb.	.13
White	"	.14
CHALK—Lump, bulk	sh.ton	3.25
Ppt. per quality	lb.	.03¾@.06
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE—		
(50% ch.) ex-ship N. Y.	lg.ton	24.75
Bricks f.o.b. Pittsburg	M	175.00
CLAY, CHINA—Am. com., ex-dock, N. Y.	lg.ton	8.00
Am. best, ex-dock, N. Y.	"	9.00
English, common	"	12.00
Best grade	"	17.00
Fire Clay, ordinary	sh.ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.26@2.30
Gray	"	2.28@2.40
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—In bulk	100 lbs.	.42½
In bbls	"	.47½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.25
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25 lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock" B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.18
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for ultro, (32-2-10° Be.)	"	.13⅞@.14
FELDSPAR—Ground	sh.ton	8.00@9.00
FLINT PEBBLES—Dan. Best.	lg.ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Am. lump. 1st grade	sh.ton	14.40
2d grade	"	13.90
Gravel and crushed, 1st gr	"	13.40
2d grade	"	12.40
Ground, 1st grade	"	17.90
Ground, 2d grade	"	16.50
Foreign, lump	"	8.00@12.00
Ground	"	11.50@14.00
FULLER'S EARTH—Lump	100 lbs.	.75
Powdered	"	.80

GRAPHITE—Am. f.o.b. Providence, R. I., lump	Cust. Meas. sh.ton	Price. $8.00
Pulverized	"	30.00
German, com. pulv.	lb.	.01¼@.01½
Best pulverized	"	.01½@.02
Ceylon, common pulv.	"	.02¾@.03½
Best pulverized	"	.04@.08
Italian, pulv.	"	.01m
GYPSUM—Ground	sh.ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg.ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—Gr'd.		
American best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100 lbs.	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l	"	.01¾
True	"	.04
Oxide, pure copperas color.	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
KRYOLITH—(See Cryolite.)		
LEAD—Acetate, white	"	.08¼@.08½
Brown	"	.06¼@.06½
Nitrate, com'l	"	.06½
" gran.	"	.08¼
LIME—Com., abt. 250 lbs.	bbl.	.80
Finishing	"	.90
MAGNESITE—Greece.		
Crude (95%)	lg.ton	6.00@6.50
Calcined	sh.ton	17.50@18.00
Bricks	M	170.00
Am. Bricks, f.o.b. Pittsburg	"	175.00
MAGNESIUM—		
Carbonate, light, fine pd.	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01¾
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lbs.	.75@.95
MANGANESE—Powdered, 70@75% binoxide	lb.	.01¼@.01½
Crude pow'd. 75@85% binoxide	"	.01½@.02½
85@90% binoxide	"	.02¼@.03¼
90@95% binoxide	"	.03¼@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore, 50%, Foreign	unit	.18@.19
Domestic	"	.20
MARBLE—Flour	sh.ton	6.00@7.00
MERCURY—Bichloride	lb.	.77
MICA—N. Y. gr'nd, coarse	sh.ton	33.00@38.00
Fine	lb.	.00¼@.02
Sheets, N. C., 2x4 in.	"	.30
3x3 in.	"	.80
3x4 in.	"	1.50
4x4 in.	"	2.00
6x6 in.	"	3.00
MINERAL WOOL—		
Slag, ordinary	sh.ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 29 gr.:		
25@30, cold test	gal.	.11½@.12½
15, cold test	"	.12½@.12¾
Zero	"	.13½@.13¾
Summer	"	.11@.12
Cylinder, dark steam ref.	"	.10½@.11¾
Dark, filtered	"	.15½@.17½
Light, filtered	"	.16½@.19
Extra cold test	"	.27½@.31½
Gasoline, 86°@90°	"	.16@.21
Naphtha, crude, 68°@72°	bbl.	11.05
"Stove"	gal.	.14½
Linseed, domestic raw	"	.43@.46
Boiled	"	.48
Calcutta, raw	"	.75
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Chrome green, common	"	.03
Pure	"	.16
Yellow, common	"	.10¼
Best	"	.25
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd	"	.05⅝@.06
English flake	"	.08¼@.08½
Glassmakers'	"	.07⅝@.08½

PAINTS AND COLORS—	Cust. Meas.	Price.
Metallic, brown	sh.ton	$19.00
Red	"	16.00
Ocher, Am. common	"	9.25@10.00
Best	"	21.25@25.00
Dutch, washed	lb.	.04¾
French, washed	"	.01½@.01¾
Orange mineral, Am.	"	.08½@.08¾
Foreign, as to make	"	.08½@.11
Paris green, pure, bulk	"	.12
Red lead, American	"	.06@.06½
Foreign	"	.06¾@.08
Turpentine, spirits	gal.	.68@.68½
White lead, Am., dry	lb.	.05¼@.05½
American, in oil	"	.06¼@.06¾
Foreign, in oil	"	.06⅝@.09⅛
Zinc, white, Am., ex dry.	"	.04⅝@.04¾
American, red seal	"	.06⅛
Green seal	"	.07
Foreign, red seal, dry	"	.06@.08½
Green seal, dry	"	.06½@.09⅛
POTASH		
Caustic, ordinary	"	.04½@.04⅝
Elect. (90%)	"	.06¼
POTASSIUM—		
Bicarbonate cryst	"	.08¼
Powdered or gran.	"	.14
Bichromate, Am.	"	.08½@.08¾
Scotch	"	.08½@.09
Bromide, bulk	"	.23
Carbonate (80@85%)	"	.03½@.04
Chlorate, f.o.b. works	"	.07@.07⅛
Foreign, f.o.b. N. Y.	"	.07⅛@.07¼
Chromate	"	.35
Cyanide (98@99%)	"	.20@.20½
Kainit	lg.ton	9.50
Manure salt, 20%	100 lbs.	.66
D'le Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09¼@.10
Prussiate, yellow	"	.13¼@.13½
Red	"	.34
Sulphate, 90%	100 lbs.	2.11
96%	"	2.14
Sylvanit	unit	.41
QUARTZ—(See Silica).		
SALT—N. Y. com. fine	280 lbs bbl.	.72@1.15
N. Y. agricultural	sh.ton	4.40
SALTPETRE—Crude	100 lbs.	3.40
Refined	"	4.25@4.62½
SILICA—Best foreign	lg.ton	10.00@11.00
Ground quartz, ord	sh.ton	6.00@8.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.31
Oxide	"	.85@1.10
SODIUM—		
Bicarb., ordinary, f.o.b. w'ks	100 lbs	1.12½@1.25
Foreign, f.o.b. N. Y.	"	1.50
Extra domes., f.o.b. w'ks	"	3.00
Bichromate	lb.	.06¼
Carbonated ash, high test, in bags, f.o.b. works	100 lbs.	.72½@.75
Foreign, f.o.b. N. Y.	"	.90@.92½
Caustic, 60@78%, f.o.b. w'ks	"	1.65@1.70
Foreign, f.o.b. N. Y.	"	1.90@2.00
Chlorate, com'l	"	.07½@.07⅝
Hyposulphite, Am.	100 lbs.	1.60@1.65
German	"	1.70@1.90
Nitrate, spot	"	2.25
Shipments	"	1.87½@2.00
Peroxide	lb.	.45
Phosphate	"	.02½@.02¼
Prussiate	"	.09¾
Sal soda, f.o.b. works	100 lbs.	.55
Foreign, f.o.b. N. Y.	"	.67½
Silicate, conc.	"	.06
Com'l	"	.01
Sulphate, com'l	100 lb.	82½
Sulphide	lb.	.01¼
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lbs.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.15
TALC—N. C., 1st grade	sh.ton	18.00
N. Y., Fibrous, best	"	10.00
French, best	100 lbs.	1.25
Italian, best	"	1.62½
TAR—Regular	bbl.	2.35
Oil barrels	"	4.35
TIN—Crystals	lb.	.22
Oxide	"	.45
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@.09½
Carbonate, ppt.	"	.09
Chloride solution, com'l	"	.02¼
Chloride granular	"	.04¼@.04⅝
Dust	"	.04⅝@.04½
Sulphate	"	.02¼@.02¼

THE RARE EARTHS.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.09
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Nitrate	oz.	.50
STRONTIUM—Nitrate	lb.	.07⅝@.08
THORIUM—Nitrate 49@50%.	"	4.50
URANIUM—Nitrate	oz.	.25
YTTRIUM—Nitrate	lb.	40.00
ZIRCONIUM—Nitrate	"	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.